THE IRON AGE

THURSDAY, SEPTEMBER 18, 1902.

The Düsseldorf Exhibition.

At the recent meeting of the Iron and Steel Institute Dr. Wedding of the Royal School of Mines at Berlin presented to the visiting ironmasters a brief review of the salient features of the iron and steel exhibits, which we shall follow, omitting references to the Krupp and Gutehoffnungshuette described in a recent issue of *The Iron Age*.

The Hoerder Bergwerks und Huettenverein has a special building in which there is exhibited chiefly shipbuilding and railway material. Ship plates, reverse bars for the ship framing, deck beams, &c., of excellent finish are shown. A marine boiler end plate of 11¾ feet in diameter is formed of a single piece of plate, the material being open hearth steel. A marine crank shaft of 22 inches in diameter, also of open hearth steel, is displayed. All the shafts are bored out through the center, partly with the object of reducing their weight and partly to obtain assurance as to the soundness of the material within. The perfection of the steel castings is particularly evidenced in the appearance of the huge stern posts with rudder and propeller. The surface of the machined parts of wheels, shafts, &c., is almost entirely free from blow holes. The Hoerde Works have in recent years taken a leading part in all that concerns the metallurgy of iron, and have won for themselves a well deserved reputation, owing to the public spirited manner in which they have never failed to publish the results of trials and experiments, whether attended with success or otherwise. The capacity of the rolling mills is manifested by a rail 250 feet long. The large plates of extreme thinness—down to 0.039 inch, for instance—afford further proof of their perfection.

THE HALL OF INDUSTRY AT THE DÜSSELDORF EXHIBITION.

The next in order is the display of the Bochumer Verein for mining and cast steel manufacture, which is also accommodated in a separate building. Finished products of extreme purity and homogeneity of composition, cast in mild steel, such as portions of marine engines, shafts and articles of every description, show a high degree of perfection, as also do the heavy forgings. Here, too, is to be seen another hollow bored shaft of great length with the core consisting of a single piece. Attention is also drawn to three steam pistons of forged mild steel, the largest of which has a diameter of about 7 feet 10 inches. In addition to these may be seen a stern post weighing 89 tons, made of molded cast steel,

a masterpiece of its kind, built up in four sections. Lastly, the Bessemer converter ring is also deserving of notice. The railway material is specially noteworthy, in particular the cast spoked wheels, on account of the exactness and clearness of the casting. A peculiar branch of work undertaken by this firm is that of bell founding, exemplified here by bells of large and small size, all of beautiful tone. The harmonious peal in the tower is set in motion by an electric device of special construction.

The Rheinische Metallwaaren und Maschinenfabrik of Düsseldorf have a special building in which there are exhibited seamless hollow bodies in great variety of form, which have all been manufactured by the Ehrhardt process. The method consists of the piercing by means of a mandrel circular in cross section of a hot billet of square section, which is held in a hollow cylindrical die. The manner in which the exact evenness in the thickness of the wall is produced is particularly striking. Gun barrels for double and treble barreled guns, and even large gun tubes, are manufactured by this process. The initial operation in the manufacture of seamless boiler rings is performed in a similar manner, the hollow billets being afterward rolled out into cylindrical rings on a rolling mill. Thus both riveted and welded seams are dispensed with in the finished course.

Four smaller pavilions are now entered, the first one being that showing the Goldschmidt process (the Thermite Company), where may be witnessed the welding of portions of iron by means of thermite, a mixture of aluminum and oxide of iron; also the reduction of carbon free metals, more particularly manganese and chromium. Next is the Niederrheinische Hütte, containing an exhibit which is admirably elucidated by analyses. Then follows the exhibit of Dr. Otto of Dahlhausen, where may be seen a full sized model of the most modern type of coke oven, fired from below by means of gas burners. Lastly, the pavilion of the Buderus Iron Works at Wetzlar, which, besides exhibiting a beautiful model of a blast furnace, also illustrates the utilization of blast furnace slag for cement making.

The great Hall of Industry, shown in the accompanying engraving, is visited in turn, where the magnificent display of the Phœnix Company at Laar, near Ruhrort, confronts the spectator. Among a great number of objects, material and products, finished wholly or in part, is a large collection of girder rails for tramways, which is most especially deserving of notice. The etching specimens of old and new products near the central column are highly instructive.

The central circular road leads through a series of exhibits of tube and plate works, which are classified in such a manner as to permit of an interesting comparison of their efficiency. On the right hand is the stand of the Düsseldorf-Röhren Walzwerk (formerly Poensgen & Co.), with welded tubes of all kinds (drawn, rolled and butt or lap welded). Besides these are other hollow bodies, the excellence of the material of which is shown in the flanged and bent portions. On the left are placed the objects of the Schultz Knaudt Company, the special feature of which consists of boiler rings, both plain and corrugated, with welds of excellent workmanship left in the rough state, water gas having been exclusively used for heating the plates preparatory to welding. The tall columns, the highest of which is 35¾ feet, are evidence of the remarkable skill exercised in the manufacture of these products.

The succeeding stand is that of Harkort, in Duisburg, distinguishable by the central revolving pedestal with the bust of Prince Bismarck. Here the chief objects of interest are the plates for the construction of burglar proof safes, manufactured with different degrees of hardness.

Further on, on the right, is Piedbœf & Co., with tubes and hollow articles of the most intricate kind, welded by hand. On the left, again, follows the Duisburger Eisen und Stahlwerk, showing specimens of heavy work, in particular end plates for marine boilers.

The exhibit of the German-Austrian Mannesmann tube works is the next in turn on the right. This most instructive collection displays the process of tube manufacture by the method of oblique rolling, which failed to fulfill all that had at first been expected of it, and is now only used in the preliminary stage of manufacture. The tubes are brought to their final state of perfection by the use of the so-called Pilger process.

Confronting this is the stand of the Krieger Steel Works, with beautiful specimens of the firm's products, comprising for the most part shipbuilding material.

The collective exhibition of the Siegerland is now entered. This district forms the southern part of Westphalia, and is widely celebrated on account of the great wealth of its mineral lodes, containing spathic iron ore, rich in manganese, from which are produced white pig iron and spiegeleisen. The progress achieved here in the last decades may be noted by comparing the two full sized models of an old and a new blast furnace. Mention must also be made of the models of Burgers of Schalke, which show how a blast furnace may be constructed entirely of iron, provided it is properly cooled on the outside.

Chilled rolls of great superiority form a specialty of the Siegerland. Unfortunately, no fractures are shown of these rolls, which are manufactured in different degrees of hardness; by this means the depth to which the hardening penetrates would have been apparent.

The way now leads past several small exhibits—Söding & Halbach, the Aplerbeckerhütte and Capito & Klein. The latter show some thin plates made of Siegerland iron. These are followed by the Aachener Hütten Aktien Verein at Roth Erde, and again the Phœnix Works. Then the tube and plate making section is once more passed through. Boecker & Co. of Schalke and the stand of the Wittener Guss-Stahlwerke are reached. This section is devoted to the display of molded steel castings of mild steel, numerous and excellent specimens of which are to be seen on all sides. The extraordinary improvements which have been effected in this particlar branch will be realized on examining these castings. Until quite recently it was practically an impossibility to obtain a mild steel casting free from blow holes, yet the specimens, which in many instances are purposely left in the rough state, show no cavities either on the surface or in the fractures.

The collection of Felix Bischoff, in the section of the collective exhibition of the Siegerland, forms one of the most instructive collections with regard to the composition, and the qualities dependent thereon, of the various kinds of tool steel, more especially of the high speed tool steels which are now coming into general use and are already extensively applied for rough turning in those works equipped with sufficiently powerful lathes.

Passing on, the way leads between the Gelsenkirchener Stahlwerke, formerly Munscheid, with a large cylinder cover 7 feet 10 inches in diameter, and the Saarbrückener Guss-Stahlwerke at Malstatt-Burbach, with a revolving turret cover, and a ship's stern post of 25 tons weight, also a nickel steel armor plate which has been subjected to a ballistic test and shows in the fracture the excellent quality of the cast steel. The Oberbilker Stahlwerke follows, with a fine propeller shaft for a marine engine.

The steel works appliances of Laeis, at the end of the passage, are worthy of attention, comprising a stamping machine for Bessemer converter bottoms, and also a casting ladle. Returning through the central avenue, there may be seen on the one side the Westphalian Steel Works of Bochum, and on the other Grillo, Funke & Co. On all sides the excellence of the mild steel castings calls for admiration.

In the stand of Oeking & Co. are exhibited the interesting patent couplings of R. M. Daelen of Düsseldorf.

The Rheinische Stahlwerke affords many proofs of the improvements in mild steel castings as well as in forgings and rolled pieces. The Hochfelder Walzwerke is also represented, showing chain cables for ships. Besides this there is the Emscherhütte exhibit.

The American Copper Company, Williamsport, Pa., recently incorporated under the laws of Wyoming with a capital stock of $1,000,000, have purchased the Albany

group of claims in the Douglas Creek district in Albany County, Wyoming. The company intend to mine, treat and sell copper, platinum and kindred ores and metals. Later on additional properties will be acquired and operations extended from time to time in the same region.

The Material for the Battle Ship "Connecticut."

WASHINGTON, D. C., September 16, 1902.—The Secretary of the Navy on the 10th inst. opened bids for approximately 7466 tons of material for the battle ship "Connecticut," which is to be built under the act of July 1, 1902, by the Government at the Brooklyn Navy Yard. These materials embrace ship plates, nickel steel plates, shapes, steel castings and hull rivets, to be furnished in accordance with approved naval standards. Proposals were submitted by the United States Steel Company, the Carbon Steel Company, the Central Iron & Steel Company, the Carnegie Steel Company, the Bethlehem Steel Company, the American Iron & Steel Mfg. Company of Lebanon, Pa.; the Penn Steel Castings & Machine Company of Chester, Pa., and the American Steel Casting Company of Chester, Pa. Following are the bids in detail:

The Bids.

Class 1.—About 4206 tons of ship plates, to be principally of medium grade steel with small amounts of flange and common steel, including shell plating below protective deck, 20 to 25 pounds per square foot; shell plating above protective deck, 20 to 32½ pounds per square foot; protective deck, lower course, 20 pounds per square foot, and miscellaneous plates, 7½ to 30 pounds per square foot: Carbon Steel Company, 2.25 cents per pound; Central Iron & Steel Company, 1.98 cents per pound and 10 cents per 100 pounds additional for 7½-pound plates; Carnegie Steel Company, 1.90 cents per pound, or $179, 007.36 for the class.

Class 2.—About 987 tons of nickel steel plates to conform to the requirements of nickel steel protective deck plating, including protective deck plates, 3-inch gun protection, splinter bulkheads, port sides, turret shelf plates and miscellaneous tapered plates, the class ranging from 1 to 3 inches in thickness: Carbon Steel Company, 7.25 cents per pound; Carnegie Steel Company, 7.15 cents per pound, or $158,007.92 for the class.

Class 3.—About 1825 tons of ship shapes, including deck beams, frames, stringers, stiffeners, &c., in channels, angles and T-bars (146 tons of 10-inch channels to be cambered): Carnegie Steel Company, 1.9 cents per pound on the total class, except cambered channels, for which 25 cents per 100 pounds extra will be charged, making a total for the class of $78,489.60.

Class 4.—About 188 tons of steel castings, including upper stem casting, 2.5 tons; lower stem casting, 14.9 tons; stem post casting (may be in two parts), 152 tons; counter casting, 4.4 tons; rudder post casting, 8 tons, and miscellaneous castings from 1 ton down to small fittings, 142.9 tons: United States Steel Company, 6.95 cents per pound on all items except miscellaneous castings, on which bid is 6.48, or $27,763.38 for the class; Bethlehem Steel Company, 7.72 cents per pound, or $32,510.46 for the class; Penn Steel Casting & Machine Company, 10 cents per pound, or $42,112 for the class; American Steel Casting Company, 7.44 cents per pound, or $31,352.38 for the class.

Class 5.—About 260 tons hull rivets, miscellaneous sizes: Central Iron & Steel Company, from 3.05 to 4.05 cents per pound, according to size, or $18,555 for the class; American Iron & Steel Mfg. Company, from 3.01 to 6 cents per pound, or $19,353.60 for the class.

After a careful examination of the scheduled proposals the Department decided to accept the bids of the Carnegie Steel Company on Classes 1, 2 and 3; of the United States Steel Company on Class 4 and of the American Iron & Steel Mfg. Company on Class 5, and the contracts have been thus awarded. The last named company made a higher bid for the total of Class 5 than the Central Iron & Steel Company, but an analysis of the latter bid shows it to have been based upon a ton of 2000 pounds, whereas the specifications called for the gross ton of 2240 pounds.

The Navy Department will make a special point of the prompt delivery of this material. The bulk of the ship plates will be ordered within six months from the date of contract, and the rate of delivery required will be about 200 tons a month. The greater part of the ship shapes will also be ordered within six months, and the delivery will be at the rate of 200 tons per month. Castings will be required to be delivered as needed on reasonable notice, as will also hull rivets.

Description of the Battle Ship.

The battle ship "Connecticut," which the Government is to build in the Brooklyn yard, will be a sister ship to that for which bids will be opened by the Department on October 1. The general dimensions and features of the vessel are as follows:

Length of load water line	450 feet
Breadth, extreme, at load water line	76 ft. 10 in.
Displacement on trial, not more than	16,000 tons
Mean draft to bottom of keel at trial displacement	24 ft. 6 in.
Gross draft, full load, about	26 ft. 9 in.
Total coal bunker capacity, about	2,200 tons
Coal carried on trial	900 tons
Feed water carried on tr'al	66 tons

Main Battery.—Four 4-inch breech loading rifles, 8 8-inch breech loading rifles, 12 7-inch breech loading rifles.

Secondary Battery.—Twenty 3-inch 14-pounder rapid fire guns, 12 3-pounder semiautomatic guns, 6 1-pounder automatic guns, 2 1-pounder semiautomatic guns, 2 3-inch field pieces, 2 machine guns of 0.30 caliber, 6 automatic guns of 0.30 caliber.

The engines will be of the vertical, twin screw, four cylinder, triple expansion type, of a combined indicated horse-power of 16,500. The steam pressure will be 250 pounds. The stroke will be 4 feet. The ratio of high pressure to low pressure cylinder will be at least 1 to 7, and the diameters will be sufficient for the required indicated horse-power at about 120 revolutions per minute. Each engine will be located in a separate water tight compartment. They will be provided with all the necessary auxiliaries and accessories in accordance with the latest practice of the Bureau of Steam Engineering.

There will be 12 boilers of the Babcock & Wilcox type, placed in six water tight compartments. They will have at least 1100 square feet of grate and 46,750 square feet of heating surface, and must be able to furnish steam for the main engines and all the necessary auxiliary machinery and other steam machinery throughout the ship with an average air pressure in the ash pits of not more than 1 inch of water. All the necessary auxiliaries and accessories will be provided for the efficient working of the boilers. There will be three funnels, each 100 feet high above the base line. Sixty-six tons of fresh water will be carried on trial in the double bottom or in reserve tanks for use of the water tube boilers.

The following auxiliary steam machinery of approved make and design, in addition to that pertaining to the main engines and dependencies, is to be supplied: Steering engine; windlass engine; ash hoist engines for each fire room; forced draft blowers; dense air ice plant with a cooling effect of 3 tons of ice per 24 hours; evaporating plant to consist of not less than four units, having a total capacity of 16,500 gallons of fresh water per day; a distilling apparatus capable of condensing at least 10,000 gallons of water per day.

The vessel is to be heated with steam throughout. The weight of all machinery, tools and spare parts will be about 1500 tons. The vessel is to be lighted throughout by electricity. The electric plant will consist of eight 100-kw. steam driven generating sets, all to be of 125 volts pressure at the terminals, disposed in two separate and independent dynamo rooms. Six electrically driven generators for power supply to turret turning motors; 1100 electric fixtures, complete, with necessary incandescent lamps and outlets; ten inclosed arc lamps located in engine and fire rooms as directed; six 30-inch search lights mounted on platforms on bridges, with spare parts; two truck lights, with controller and stand complete; electric night signaling sets, diving lamps, ventilating sets, desk and bracket fans, &c. W. L. C.

Cuban Duties to Be Advanced.

Duty on Machinery to Be Doubled.

WASHINGTON, D. C., September 16, 1902.—The State Department has received important advices from Minister Squiers at Havana which indicate that before the end of the present month the duties levied upon certain important classes of machinery and implements imported into Cuba will be doubled. This result will be brought about by the expiration of a special order of the War Department promulgated September 28, 1901, which granted a rebate of 50 per cent. of the duties on these articles. The Minister reports that it is apparently not the intention of the Cuban Congress to extend this order at the present session, and that after the 28th inst. the rebates now being allowed will be discontinued.

Readers of *The Iron Age* will remember that the War Department issued an order (No. 206), under date of September 21, 1901, officially promulgated in Havana September 28, 1901, the text of which was published in these columns at the time, in which revised rates were proclaimed for certain machinery, apparatus, &c., embodied in Group 2, Class 11, paragraphs 214 to 226 inclusive, of the military tariff then in force. In this order it was provided that a duty of 10 per cent. ad valorem should be levied upon machinery and apparatus for making sugar and brandy, embraced in paragraph 215, and upon agricultural machinery and apparatus, embraced in paragraph 216. It was further provided, however, that "the articles included in paragraph 215 which shall be imported within 12 months from the date of the promulgation of this order shall be entitled to a rebate of 50 per cent. of the duties specified in said paragraph, under such conditions and guarantees as the chief of the customs service, with the approval of the military governor, may direct."

This concession was limited exclusively to weighing machines (platforms) for weighing sugar cane; complete machines of every kind for grinding cane; cane shredders, sugar clarifiers, complete apparatus for diffusion, purifying apparatus, filters and filtering apparatus, apparatus called trenes jamaiquinos, complete; furnaces for making animal black, steam desiccators (trampas) and granulators, centrifugal machines, mixing and lifting (subsidores) machines, with their motors; vessels called bombonas and cachimbas, skimmers, distributers and sugar molds, apparatus or vessels (tachos) acting in vacuum, also their machines, pipes and cocks, of copper or iron; polarimeters; skimming pails (cachaceras), sugar crushers, cars (porta-templa), sulphurous gas apparatus, dumping apparatus (porta-templa), cane transporting apparatus, furnace for burning bagasse; automatic circulator and regulator for vacuum kettle apparatus and apparatus for compressing sugar. Also the following articles when they are imported directly by or for planters, on proof of the installation thereof in their establishments: belting for granulators, centrifugals and lifters (subsidores); tubes, flues, cocks, shafts, crowns and rolls for sugar mills, boilers, steam plows, donkey engines with or without pumps, carts for the conveyance of cane and the output of the works, stills, gasometers for lighting the works, electric plants and apparatus for use exclusively in lighting the works of a cane estate or farm; wind mills, fire brick for the installation of boilers and furnaces, portable rails and plantation railways.

It was also provided that articles included in paragraph 216 (agricultural machinery and apparatus) imported within 12 months from the promulgation of the order should be entitled to a rebate of 50 per cent., provided that the machines must be complete but without spare parts; that the machines must be imported in a single shipment; and that the machines and apparatus must be those "employed by farmers and agriculturists for preparing the ground and gathering the crops; also those employed in order to clean the crops and improve them without essentially changing their nature."

Under these two provisions, therefore, the rate of 10 per cent. ad valorem was reduced by rebate to 5 per cent., which has been levied on all importations made within the past year. The order of the War Department fixing the rates of duty on the paragraphs mentioned therein contained no limitation as to the period during which it should remain in force and the Cuban Government adopted it as a part of the permanent tariff. The provisos to paragraphs 215 and 216, however, specify that the rebates should be granted for 12 months only from the date of promulgation, September 28, 1901. This period is about to expire. To meet this situation the representatives of Cuban importers and planters have drafted a bill which has been introduced in the Cuban Congress providing for an extension of the rebate privilege for another year. President Palma, who is credited with the laudable desire to advance the material interests of the island, is said to be very favorable to this bill. Minister Squiers reports that there is no disposition on the part of either House of Congress to take any action on the measure in the immediate future, owing to "pressure of other business."

In view of the fact that the machinery and apparatus covered by the two paragraphs referred to are greatly needed by the Cubans it is difficult to understand why the Cuban Congress should be so heedless of the interests of the people of the island, but administration officials here are of the opinion that this is a demonstration planned in a spirit of retaliation for the failure of the United States to negotiate a reciprocity treaty. It is further pointed out that the leaders in the Cuban Congress do not in any sense represent the more conservative interest engaged in agriculture and in the business of importing. It goes without saying that the American manufacturers can better afford to forego the trade affected by the order referred to than the Cubans can afford to pay the increased duties, but the Cuban Congress evidently does not consider the matter in this light.

Our Government Will Oppose the Cuban Loan.

The passage by the lower house of the Cuban Congress of the bill authorizing the President of the republic to negotiate a loan of $35,000,000 has brought this important question again sharply to the attention of the administration and a partial policy with reference to it has been adopted and can be here stated on high authority. In the first place, the United States Government will not approve the loan; second, it will discountenance the pledging of the customs receipts of the island as collateral for any loan; third, it will not permit the Cuban Government to float a $35,000,000 loan at a heavy discount through the medium of speculators.

The bill as passed by the Cuban House provides that $4,000,000 shall be utilized for the advancement of agricultural interests, and it is probable that should the bonds representing this amount be floated at no greater discount that 10 per cent., and without a direct pledge of the customs revenues, the American administration would see no reason to interfere. What is feared, however, is that although the bill provides that the bonds shall not be sold below 90, the Cuban Government, in its great desire to secure funds to stop the clamor of the revolutionary element demanding to be paid for services rendered during the war, will make a secondary agreement of some kind with speculators who would be willing to take the loan at a heavy discount without any guarantee on the part of the United States, provided the customs revenues could be pledged to secure payment. These funds are now estimated at about $12,000,000 per annum, and as the loan has 40 years to run it would require considerably less than $1,000,000 per annum set aside for this purpose to establish the necessary sinking fund. There is, however, no certainty that these customs receipts will be maintained, and the American administration is unwilling to give a mortgage upon them to any foreign interest, especially as the prospect grows stronger daily that within a few years, if not months, Cuba's troubles will be terminated by the annexation of the island to the United States.

The present determination of the administration with regard to the Cuban loan has only just been reached. As heretofore stated in these dispatches, it had been thought that the matter could be disposed of without action on the part of the United States, as it was

believed that without the indorsement of this Government it would be almost impossible for the Cubans to float a loan; hence the failure to indorse would be equivalent to a veto of the plan. The action of the Cuban House, however, in authorizing the bonds to be disposed of at a discount puts a new phase on the matter and may call for prompt intervention should the bill which is now before the Senate pass that body and be approved by President Palma. Minister Squiers is under instructions to use his best efforts to induce the President to veto the bill, but in view of the present situation in the island there is little prospect that he will succeed, as such a course would greatly incense the radical element among the Cuban leaders. W. L. C.

Cotton Statistics.

On September 30, S. N. D. North, chief statistician of the division of manufactures of the Census Bureau, will address the New England Cotton Manufacturers' Association on the system for collecting statistics relating to cotton ginning in accordance with the permanent census bill which was passed by Congress last spring. The provision referred to is as follows: "That in addition to the statistics now provided for by the law the manufactures division of the Census Bureau shall annually collect the statistics of the cotton production of the country as returned by ginners, and bulletins giving the results of the same shall be issued weekly, beginning September 1 each year and continuing until February 7 following." It is understood that it has been found impossible practically to comply with the strict letter of the law in so far as the giving of weekly bulletins is concerned. The spirit of the law, however, will be carried out. It has been arranged to circulate three reports in the course of the cotton ginning season. The first of these reports will be issued about the end of October and will include all cotton ginned up to October 18. The second will be rendered toward the end of December and will include all ginning from October 18 to December 13. The third will be rendered in January and will include all cotton ginned up to January 1.

This system of furnishing accurate statistics upon subjects which are now covered only by estimates will be not only of great value to producers, spinners and factors, but will be highly advantageous to manufacturers and merchants who sell material throughout the cotton belt. The information will come from trained men who are paid for the services they may render. This is in marked contrast to the system upon which the agricultural bureau, because of lack of funds, has been forced to depend.

The Census Bureau has a very satisfactory organization by which it will be enabled to cover all but about six-tenths of 1 per cent. of the cotton crop as ginned in 1901, and even this small remnant will be covered by reports direct from ginners in unorganized counties, which will be received simultaneously with the reports from the bureau's agents in the organized counties. The division of manufactures will thus be enabled to present the result of the reports from over 29,000 establishments for the first and second preliminary official reports. For the third and final reports returns will be received from all establishments.

Western Railroad Employees to Make a Demand.—Serious labor troubles are threatened on Western railroads if employers and employees cannot get together. The statement is made that grievance committees of all the railroad organizations between Chicago, the Missouri River and the Twin Cities will meet in Chicago the first week in October to formulate a demand from the railroads, with the alternative of a strike. What the demand will be has not been determined, this having been left to the grievance committee. In general the railroads will be asked to put the trainmen on the Western railroads on a par with the Eastern lines. Representatives of the Brotherhood of Railroad Trainmen and Order of Railroad Conductors are now in the West bringing into line local unions which have not entered the agreement. When the complaints shall be formulated they will be backed by no fewer than 100,000 conductors, brakemen, engineers, firemen, switchmen and shopmen. The demand will first be made of the Chicago-Missouri railroads.

The Odd Arbitrator.

In the *Bulletin* of the National Metal Trades Association H. M. Leland of Leland & Faulconer Mfg. Company of Detroit, Mich., discusses as follows an interesting subject:

In regard to the fifth arbitrator, the writer is even more firmly convinced that he would never yield to such an arrangement, regardless of how serious the consequences might be. If we investigate the methods and internal systems of almost any eminently successful concern I believe we shall find, without exception, that they have gradually developed certain business methods and ways of handling their various departments and certain methods or systems of manufacturing, and these systems and methods have built up a large and prosperous business, and by conforming to these methods, which are equitable and legitimate, their eminent success has been attained.

Now imagine the absurdity of such a concern as this entering into an arrangement by which some one man from the outside, who knows nothing of these systems or the reasons why they exist, how they have grown up or how imperative they are to the very life it may be of the business; imagine such a man, however honest or competent he may be (and many, many times I regret to say both qualities may be fairly questioned), solely and alone, with no interest or responsibility for the business, passing upon the question of whether these systems and methods which have built up this business shall be modified, transformed or wiped out entirely, and after a few hours' deliberation quietly deciding that all the plans and systems resulting from a lifetime of careful thought and skilful application shall be destroyed simply because this man has been chosen fifth arbiter. The proposition is so illogical and suicidal that the writer is unable to see how any competent concern who have given the matter a moment's thought can entertain such a proposition. And yet I regret to say that many manufacturers and employers are being insidiously led along this dangerous road, and complications and precedents are being established which, I fear, will solely trouble them in the days that are to come. The concerns which we represented at Toronto have just been through this experience, and the agreement which they are now acting under with the men is, as I understand it, one of the results of this same absurd system (the fifth arbiter) which was worked upon them a year or two ago.

In my judgment, the only arbitration (if it may be called arbitration) which any manufacturing concern can safely engage in, where shop methods, system, and the general conditions are to be passed upon, is a conference composed of an equal number from each side, such as the National Metal Trades Association and National Founders' Association have often called upon. Such a body may reach agreements and modifications of conditions that are in a measure satisfactory to each of the opposing parties, and both sides often go away from such a conference not only having received new light and holding a different opinion than the one held when they came together, but they often go away entertaining a much more wholesome opinion of the merits and justice of the other fellow's side of the case. And if it is sometimes impossible to agree it is certainly better to disagree than it is to have an arbitrary decision made by one irresponsible man which may be very burdensome, if it does not at times seriously handicap or destroy an important and prosperous manufacturing business.

At the St. Louis World's Fair great fluted pillars 36 feet high and 4½ feet in diameter are now being made in a mold set in place, the liquid plaster being poured in at the top. Ordinarily such pillars are made in 24 pieces and set in place, leaving many joints that have to be carefully pointed. There will be 112 such columns on the Textiles Building.

English Workmen Against Compulsory Arbitration.

In the Trades Union Congress in London last week there was a heated discussion of a compulsory arbitration resolution introduced by the Dock, Wharf and Riverside Union. The resolution follows:

In view of the colossal growth of trusts and combines of speculative capitalists and consequent concentration of capital and monopoly of industry, this congress foresees the grave danger to the nation and the toilers of dislocation of trade, stoppage of work and distress of wage earners. To avert such a calamity this Congress calls upon the Legislature to pass an act creating a Supreme Court of Arbitration, the court to be presided over by a lord justice and to be constituted by an equal number of workmen's and employers' representatives, who shall take evidence from the parties aggrieved or their representatives; legal experts to be in all cases debarred from acting as representatives: the power of the court to be compulsory; conciliation courts for the various industrial centers to be formed to act in conjunction with the Supreme Court and to be termed district courts; in all cases workmen's representatives to be selected by trade unions as commissioners or members of the Supreme Court. For the effective dealing with disputes, commissioners to be constituted for the great staple trades—viz., mining, textile, transport, engineering and agriculture, with a crown judge over each. Failing the courts settling disputes, cases to be submitted to the Supreme Court. Only unions registered under the Trades Unions act and firms covered by registration under an act identical with the Trades Unions act to be eligible for consideration of courts or Supreme Court of Arbitration. We therefore instruct the parliamentary committee to draft a bill for the purposes aforesaid.

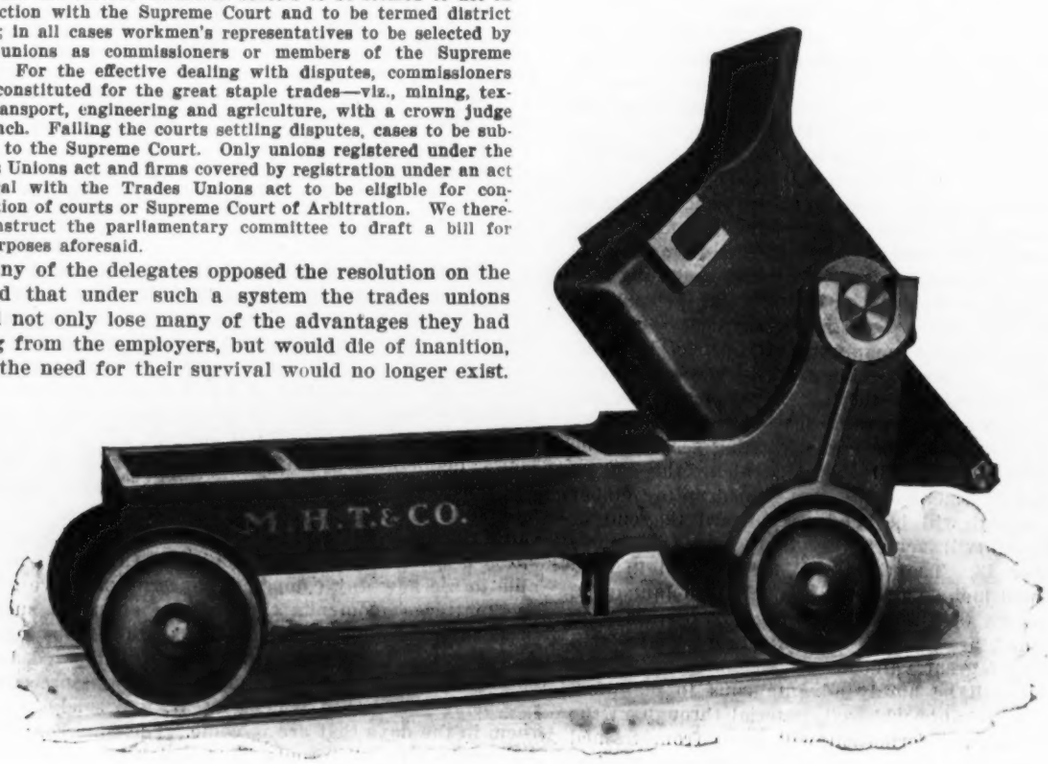
Many of the delegates opposed the resolution on the ground that under such a system the trades unions would not only lose many of the advantages they had wrung from the employers, but would die of inanition, since the need for their survival would no longer exist.

The resolution eventually was rejected by 961,000 to 303,000 represented votes.

The Pennsylvania Railroad Company's Huge Engine Purchase.—The Pennsylvania Railroad Company have formally announced a change in their plan for building most of their new locomotives themselves next year. They have placed with the Baldwin Locomotive Works the largest order ever given by any railroad company to a single locomotive works. This order calls for 250 high class freight locomotives, aggregating in cost $3,250,000, all to be delivered within the first six months of 1903. This is the first order for their 1903 equipment which has been definitely placed. Since the beginning of this year the officials of the company have been working upon estimates for new equipment. The number of freight and passenger cars to be ordered has not been decided, but it is said the company will order at least 15,000 steel freight cars. The matter of new locomotives has been a perplexing problem, as the freight congestion which has existed for more than a year has been caused more by a shortage of motive power than by a lack of cars. The passenger locomotives of the company are all built at the company's shops in Altoona, Juniata, Pittsburgh and Fort Wayne. The Altoona and Juniata shops are now being enlarged, so as to turn out yearly a larger number of freight engines, but the improvements will not be completed for many months. It has therefore been decided by the company to order at least 350 freight engines from outside builders, and the order for 250 of these has been placed with the Baldwin works. The entire number of locomotives to be ordered from outside builders will probably be increased to 400, and it is said that an order for the 150 needed outside of the Baldwin order will be placed with the American Locomotive Company. Fifty of the 250 Baldwin locomotives will be high class heavy freighters, which will cost about $14,500 each. The classes of the other 200 engines have not been decided upon.

The Treadwell Ingot Transfer Car.

The construction of the narrow gauge car here illustrated is such as to permit the ingot to be dumped automatically on the delivery tables, the car traveling on a track in front of the soaking pits or heating furnaces. The car is propelled by an engine operating a cable attached to a lug beneath the center of the car body.



THE TREADWELL INGOT TRANSFER CAR.

The tipping action, which will be understood from the drawings, Fig. 2, is obtained by a hook lever engaging with the cross bar on the front end of bucket. As the car is moved forward the action of the hook lever is to draw down the front part of the bucket and the car stops at the approach end of the delivery table. The bucket then assumes the position shown in Fig. 1 and indicated by the dotted lines in Fig. 2. The removal of the ingot is facilitated by a roller inserted in the bucket, which is on a line with the roll table on which the ingots are carried forward. The cable is then reversed and the bucket drops into its loading position ready for another charge. The bucket retains this position by means of a pivot pinion set forward of the center of gravity. Two projecting lugs are located on both sides on the back of the bucket and rest on pads on the car body. The car is of heavy construction, the body being one continuous member and made to meet the particular requirements to which it is subjected. The entire car is of steel construction with the exception of the bearings, which are of brass, and the wheels, which are cast iron with chilled treads. The bucket is made to tip with great ease, the trunnions being machined, as are also the bearings on which they rest. The hole in the bottom of the bucket allows the accumulated slag from

the ingot to be drained at frequent intervals. The car illustrated, built by M. H. Treadwell & Co., 95 Liberty street, New York, is of 3 feet 7½ inches gauge and weighs 3 tons.

English Steel Rail Makers Form a Combination.—A cable dispatch from London, dated September 12, states that negotiations have been concluded for the formation of a combination comprising all the British manufacturers of steel rails. The details have just come to light. The title of the new organization is the British Rail Makers' Association. They have no registered office or public existence and are concerned only with rails. Their aim is an offensive and defensive alliance to control prices and regulate the output. There are only eight steel rail firms in England and they comprise the combination. They have already raised the price of steel rails from 75 shillings to 95 shillings per ton.

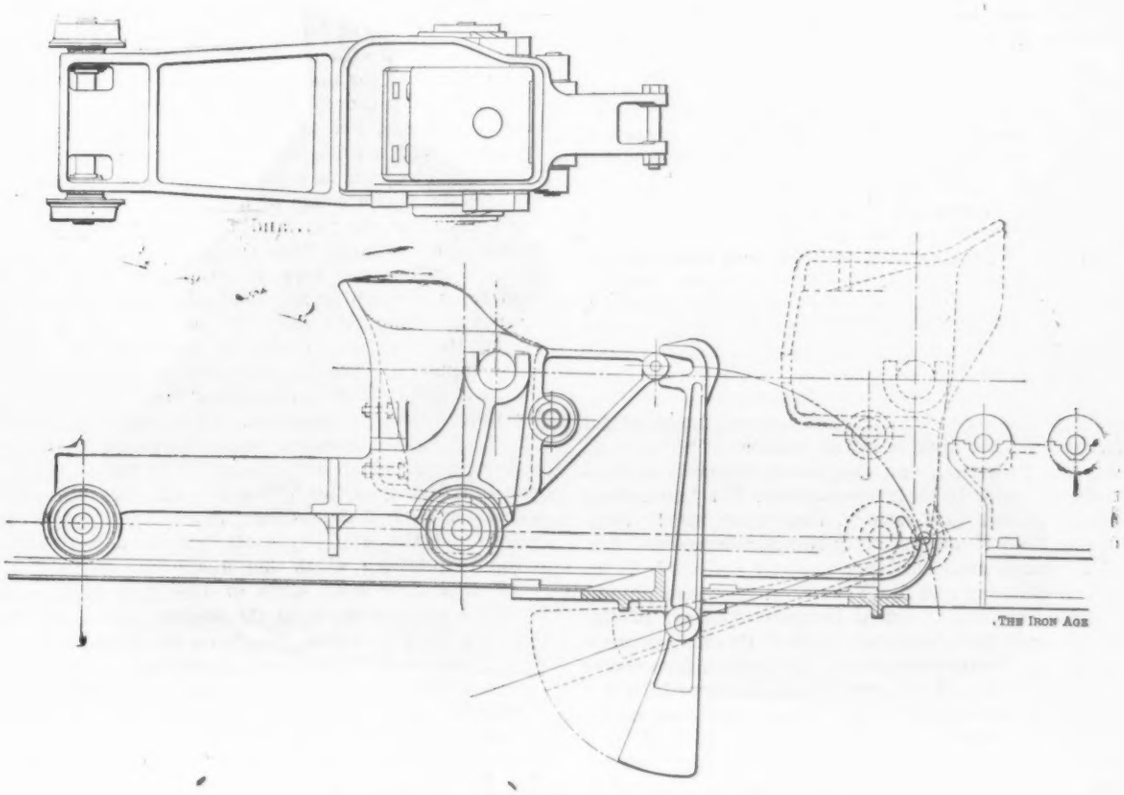


Fig. 2.—Details Showing Automatic Dumping Arrangement.

THE TREADWELL INGOT TRANSFER CAR.

The Capewell Horse Nail Works.—The Capewell Horse Nail Company, Hartford, Conn., have started to rebuild their plant, which was recently destroyed by fire, and when completed the new factory will be one of the most modern in the New England States. The building will be located on the old site, Grove and Charter Oak streets, and will be 100 x 350 feet, three stories high, with concrete floors and roof, and constructed entirely of steel and brick. The first floor will be used for the heavy nail making machinery, the tumbling barrels and machine room; the second for packing, and the third for assorting the nails. The equipment will be of the best and will include water towers placed on top of the building, to be used in case of fire. The engine and boiler rooms and offices are in separate buildings, and were not damaged by the fire. The company are at present occupying Colt's west armory, but hope to get into their new plant by January.

The Lewis Avon Lodge, composed of tin workers employed at the Laughlin Works of the American Tin Plate Company, at Martin's Ferry, Ohio, have taken anotner vote on the proposition of the American Tin Plate Company to accept a reduction in wages when rolling tin plate for export, and decided to accept the cut. The former vote of this lodge was against the proposition.

The interesting statement is made in the report of a railroad company recently issued that the building in their territory of numerous trolley lines had been found to have a tendency to distribute manufacturing plants as well as the population. This distribution of traffic requires additional facilities, but largely increases the business of the steam line. At the same time the passenger interests have not suffered from the competition of the trolley line with its cheap fare. Receipts from passenger service have increased, but the average distance of hauling each passenger has slightly lengthened. The trolley has proved an important factor in relieving congested conditions in heavily populated localities, enabling manufacturing establishments to be located wherever advantages in cheap land or railroad facilities could be secured instead of primarily considering convenience with respect to the supply of operatives.

E. B. Hotchkiss of 18 Boulevard de l'Entrepot, Brussels, Belgium, has recently placed important orders in Europe in foundry pig iron, billets and sheet bars and structural material for shipment to the United States. Mr. Hotchkiss is starting a business in Brussels for the importation of American steam engines, pumps, fittings and general supplies pertaining to steam and air service, heating and ventilating.

The Union Fire Arms Company of Toledo have been incorporated in New Jersey with $150,000 capital stock by A. B. Tillinghast, John Houweholder, G. B. Colton, George Rouse and Charles R. Clapp. The company have succeeded the Colton Mfg. Company of Toledo, and are preparing to about double the capacity of the old Colton plant in that city.

Fifty Years Among American Workingmen.

BY EGBERT F. WATSON.

In 1851 I was apprenticed to the machine business in the city of New York, and after serving my time at it I went to the Eastern States and worked there for about three years. I then went West to Michigan and worked there in various capacities as machinist and on the great lakes as a marine engineer for several more years, and in these various adventures came in contact with American workingmen of all trades, so that I have had opportunities of seeing them in every aspect of life. During later years I have been an employer of them, and have had every sort of experience, except a strike, connected with workingmen. I only mention the above facts because they furnish some reason for the observations recorded in this article. I have been deeply interested, and am still, in all that concerns the moral and material welfare of those who live by wages, and while my reflections and assertions may not be accepted by all, they are honest testimony, without bias, upon that human document—the American workingman. I use the word American to distinguish those employed in American shops and institutions upon American plans, whether they were native or naturalized citizens. For the purposes of this article it does not matter which class they belonged to; but without further discussion of this point let me go back 50 years and depict the social and material condition of

Mechanics Fifty Years Ago.

At that time the working forces were a mixed lot in large cities. Immigration had not set in to any great extent, but the advance guard consisted of English, Scotch, German and French, not a great many of the latter, and few or none at all of Italians. The vast majority was American, and they were distinctly and assertively clannish in their associations. Foreigners were not exactly sent to Coventry, they were barely tolerated, and held to be distinctly inferior in manual dexterity to Americans. This was specially noticeable in the matter of chipping and filing surfaces, by which process so much work was executed in the early days of this country. American workmen prided themselves upon their skill in this direction, and with justice, for experts would remove or dress down rough surfaces in much less time of far better quality than foreigners could. American chipping hammers were totally different from those used by foreigners, having the ball pene of the present day and handles 14 inches long with the necks of them shaved down to about ⅝ inch, so as to spring a little, while foreign chipping hammers brought over by their owners resembled those used by stone cutters, having short, stubby handles about 8 to 10 inches long, and were grasped close to the neck by foreigners when in use. The chisels were also very different in shape; American workmen could scarcely get them thin enough, while foreign workmen used to grind theirs so that they were as stubbed as a blacksmith's cold chisel, the result being that our men could do twice as much with half the labor that the others put forth, but no amount of example could induce them to change. An American would stand a foot away from the job, and swinging the hammer over his shoulder through a long arc bring it down with tremendous force on the chisel, while the foreigner would peck away with his little hammer, giving taps like a foraging woodpecker. In other branches the methods of foreigners and natives differed greatly. In setting up or fitting details our men would begin at one end and go straight on to completion, while an alien would do a little here and there, stop and look around the shop frequently to rest his mind, spit a little, and take up the burden of the day in a half hearted, desultory manner as the spirit moved. If American workmen were gregarious and herded together some of the aliens were quite as much so; it was very common to hear English and Scotchmen boast of the glories of the Clyde and of the Liverpool dock yards, like which there was nothing in this country.

The slowness of the foreigners was constantly thrown in their faces; taunts and reproaches, however, had no effect upon them, and they calmly held the uneven tenor of their way. In quality of workmanship the foreigners were not, as a rule, equal to Americans, but there were more average men among them than in an equal number of Americans. If by chance a foreign gang was pitted against a domestic gang the latter would come out ahead every time, simply from a desire to keep up the prestige of their countrymen. It was a good natured rivalry upon the whole, but sometimes short-lived disturbances would occur.

The Man Himself.

The native American workman in 1850 was a young man who had as much education as the public schools could give him. He was never illiterate in any sense of the word, because he could read and write, spell fairly well, and had a working knowledge of the regions or States around his own. I can recall but one man out of several thousand in one shop who could not read or write, and he was of foreign parentage. There may have been others, but although thrown into intimate association with them for many long years they were not detected. Among the foreigners the number of the illiterate was large, but as they do not come into consideration I will not discuss their shortcomings further. The American man, as a rule, was honest and conscientious in the performance of his duties. He gave a fair day's work for fair pay, and although it was small, or would be called so in these days, he received the going rate. If he had any personal grievances with the proprietors or foremen he reckoned with them himself, and did not go around the shop striving to create sympathy among the rest and break up the business. Strikes were unknown; I do not say that no strikes ever occurred in the United States during the years mentioned, for that would be incorrect. There was one notable strike of ship carpenters somewhere about 1854 for higher wages, which not only failed in its principal object, but destroyed the business itself, for ship owners thereafter sent their orders "down East," as it was called, and the ship yards of New York were struck with a blight from which they never recovered.

At that time both sides of the East River, from Brooklyn to Greenpoint on the eastern shore and from Corlear's Hook to Jones' Woods on the west, were lined with yards which employed thousands of men and turned out hundreds of vessels; they were always full of work, but under the malign influence of a strike they gradually dwindled away, and to this day have never resumed wooden vessel building, though many of this class are still built in New England yeards.

The American workman married early, as a rule, and brought up his family creditably, in accord with his circumstances. All the members of it were decently clothed and lodged, though in this last detail he had to be content with limited room, for rents were even then high. Usually he occupied a "floor," a series of rooms on one story, the rent of which varied with the hight from the ground, but sometimes, before his famly increased in number, he had to be content with two rooms, for which he paid from $6 to $8 per month, according to the locality. This little home was always neatly kept and comfortably furnished. There would be a good bed, an ingrain carpet on the floor, a stove, and all the equipment of chairs, tables, &c., necessary for decent living, and as the man got on in the world there would be a "best room," in which some little display of better furniture and ornament would be attempted. But whatever else might be lacking in an American workman's home half a century ago, food of the best quality and in plenty was always provided; beef was cheap compared to present prices, the best cuts being but 10 cents per pound, and potatoes could be had for 30 to 50 cents per bushel. Butter was 10 to 12 cents per pound, and eggs, vegetables, condiments, tea and coffee, &c., were proportionately low priced. The breakfast was always substantial, beefsteak and fried potatoes with sometimes buckwheat cakes added when in season, liver and bacon, ham and eggs, fish, &c. These last cost from 4 to 6 cents per pound, while oysters could be had for 10 cents per quart; so, like Jeshurun, the American "waxed

fat," but unlike him he never kicked unless sorely bested.

As a consequence of a liberal diet before going to work the American workman never, or very seldom required, a lunch between meals, while the foreigners were compelled to heave to about nine o'clock and lose half an hour of the bosses' time in eating sandwiches from paper bags which they had brought in anticipation of emergencies. This custom was so universal among all of them that it drew forth comment from the Americans who used to tell them that if they would stop blowing themselves up with oatmeal porridge in the morning and eat a square meal they would not have to steal the bosses' time so often.

Social Life and Amusements.

Relaxation from labor was seldom indulged in by American workingmen at the period mentioned. As a rule they kept steadily at work the year round; there were only four legal holidays then—Christmas, New Year's Day, Thanksgiving and the Fourth of July. This last was the day of days, and was celebrated with far more vim and vigor than it now is. It began upon the night before and lasted until the evening of the second day, old and young celebrating it alike. Aside from the holidays there were social calls among neighbors and friends, the theaters, circus, picnic parks, where lager beer (just then coming into vogue in this country) could be had, and steamboat excursions to beaches or groves not far away. In his outings the workingman of the period did not seem to enjoy himself very much, seeming to feel that if he unbent, as foreigners did, abandoning themselves to the pleasure of the hour, he would look foolish in the eyes of other Americans, so he literally kept a stiff upper lip and went through everything with a bored air, apparently resolving that he would never be caught again in a similar situation. Life was much too serious a matter to waste even a day in frivolity, and he went back to work the day after his holiday with much the same feeling that a boy has when he plays truant. Even on Sunday afternoon, if he lived near his shop, he would go out for a stroll and surely bring up at the scene of the next day's job before he got home; 24 hours' relaxation was too much for his strong spirit.

Effect of Increased Immigration.

The condition of American workingmen as narrated in the foregoing lines lasted until just prior to the Civil War, say 1861, then a gradual change was apparent from the greater influx of foreign artisans. These being stronger in numbers were more assertive as to their own ways of doing things and the customs in vogue "at 'ome y' know," and attempted to dictate ways and means in shop methods. I well remember having a large crank pin in a lathe which had to be fitted to the taper eye of a crank. This pin was about 14 inches in diameter and 16 inches long on its seat, tapered about ¼ inch in this length; it was customary to fit the pin in the lathe so that it would go home to its collar with a very slight draw filing and driving, and this was done in the case cited. Two brawny Scots were to cut the keyway in the crank, and when they saw where the pin went to on the first driving they were exceeding wroth, and one of them came over and gazed fixedly at the latheman without a word. Annoyed at this surveillance he demanded the reason for it, when the Scotchman broke out with: "Mon, ye w'uldn't be let put a pin the lek o' thet on the Clyde; ye left nathing for me and my mate," and away he went, pursued by some American objurgations which were both pointed and pertinent. This incident was, in a sense, of greater moment than appeared on the surface of it, for it came out subsequently that an English trade union, the Amalgamated Society, had, even at that early day, its members in the shop, and they were endeavoring to spread their peculiar doctrines and win American artisans over to them. For a long time they made no progress whatever, but by constantly proselyting they made gains, and the Amalgamated Society has now a large following in this country.

Development of the American Workman.

It is common for essayists who have had no personal experience with their theme to dilate upon the great advance made in the past few years in the general well being and improved conditions all around of mechanics, American especially, but with every desire to agree with them broadly I fail to see where the modern mechanic excels in any material degree. I have not taken my own views wholly in this aspect of the subject, but have conscientiously interviewed a great many old men in the trade who were liberal and capable of weighing the evidence for and against, and asked them for their opinions without getting the verdict that I would like to. The witnesses have been both employers and employed, workmen and bosses alike, all of them unprejudiced in any direction, and their dicta is that, as between the rank and file of to-day and that of half a century ago there is little to chose. In some directions there has been retrogression, in others an improvement, but the consensus of all the witnesses is that the American machinist (for that is a representative industry) is not superior to his ancestor of half a century ago.

This is a sweeping statement, but before committing myself to it I put these questions to several persons in a position to know the facts in the case:

"Does the modern machinist do more work in a day than was done 50 years ago?"

Answer: "No; with his own hands the output is not as great. In machine work: Yes, he does; on account of the greatly improved tools, shop systems and management generally." Even admitting that he does more work, it is doubtful whether the increase in this direction is in ratio with the wages received—automatic machines barred. These last are usually attended to by "handy men," so called, or laborers instructed especially for certain work. They are not machinists, never having learned the trade, but are specialists, whose knowledge goes no further than the machine they attend.

Properly, handy men should not be considered in this inquiry, but they are so much in evidence in modern shops, and are classed, or at least considered to be machinists, by essayists, that I have mentioned them. In shops 50 years ago there were but few of them, because there were no automatic tools to speak of, unless bolt cutters can be so called, and there the old time handy man could be found; nowadays essayists enlarge upon them and exclaim that the modern machinist has become a man of one idea, and knows how to run one machine only, when the facts are that the alleged machinist is a laborer only. In the town where I live there is an immense factory, wholly automatic as regards its machines; the men employed in it are recruited from all walks or callings in life—butchers, bakers and candlestick makers—whatever else they may have failed in they are almost certain of employment in these works, even at an advanced stage of life. They are not machinists, only machine tenders, but an inexperienced observer seeing them in the shops would class them all as machinists.

Second question, "Is the modern machinist more intelligent or of quicker apprehension than his fellow craftsman 50 years ago?"

Answer: "No. There are more men of bright minds in the business to-day than half a century ago, because the population has increased from 23,000,000, in round numbers, to 76,000,000 in 1900, but the rank and file are no brighter to-day than they were 50 years ago, notwithstanding the educational advantages and the laws of heredity—whatever these last may be worth. Men who can take a drawing of a new machine and read it correctly, decipher all its relations, one detail with another, were common enough in 1850; they were the best men in the shop certainly, but so they are to-day. It takes just as long now to explain the ins and outs of new machines to the average man as it did half a century ago."

Third question, "Is the modern machinist well read as regards the underlying principles of all machines; does he know the correlation of force power and work, and understand the simplest mechanical laws of his trade?"

The answer was: "No, he does not; he does not give them a thought."

There is no reason why he should either, for he has nothing to do with such matters unless he is a student

by nature, in which case he is out of the category of the rank and file.

If he were possessed of the information in question he would not get any more wages than the rest of his fellows of the same grade. Of course, he could get more in another branch of machine work, but there again he would not be a shop man, which is the only class discussed at present. There are bright men in all the large shops who are sent out, far abroad sometimes, to set up jobs in localities where they have to depend wholly upon their mother wit and general knowledge to execute their task properly, but I have no means of ascertaining whether these are always old timers or more modern men. Whatever they may be the same class existed in 1850, and there were nothing like the facilities then that there are now for handling heavy shafts, fly wheels, pulleys, &c. Chain blocks had not been invented, and hydraulic jacks were not in general use until 1856-1858, so that the old timer had often to make use of the "main strength and stupidity" of the natives of the country where he was. He always executed his task creditably, and did whatever he had to without default.

It is, perhaps, not amiss to say here that all my observations regarding the subject of the caption refer to the all-round mechanic, the man who is capable of doing any work in an average machine shop, either upon tools or at the vise, not at all to those who profess to be able to do such work but cannot. One of the persons whose opinion I asked, a man who employs many machinists, said that it was almost impossible to find men who could be intrusted with work of all classes such as is usually done in jobbing shops where men may be called on to work at the bench or upon tools indiscriminately.

Possibly some who may not agree with the conclusions I have arrived at will point to the splendid machine tools of the present day, and ask how they came into existence if the rank and file have made no advance in 50 years? I must answer that they were not designed out of hand, or to fill a call for newer and better devices; they have been evolved step by step as experience suggested. Whatever is due to the shop hand for his share in the development of machine tools should be credited to him. Sometimes he makes suggestions which are valuable, and they are worked out and applied, but as a rule the machine tools of the present, like the shop systems, are suggested by the principals or mechanical superintendents, and sometimes they are so obvious or patent to any one that it almost seems as though the machines themselves "enlarged the borders of their phylacteries." As an instance of this, take the case of the milling machine. Over 50 years ago there was a machine in the Lowell, Mass., machine shop called a "slabber," why, I don't know; it was used wholly for milling hexagonal nuts, and was merely a rotary fluted cutter, the exact counterpart of those in use to-day. The nuts were strung on mandrels, held in centers, and the cutter was driven by a belt; it was the simplest form of a milling machine; when there were no nuts to be finished sometimes it would be employed for "slabbing" off "splines," as they were called, or "feathers," keys permanently sunk in shafts, and the machine did so well in the hands of inexperienced apprentices that its sphere gradually extended, and was metamorphosed into the milling machine of to-day. If I mistake not that is the genesis of the modern tool.

I have arrived at the conclusion that while modern machinists get nearly double the wages they did 50 years ago they do not deliver double the output per man. They have no better surroundings in large cities than they had 50 years ago, for they live now in apartments as they did then, and I cannot see that they are morally or materially improved in any condition of life.

The World's Wheat Supply.—The world's wheat crop for 1902 is estimated by Beerbohm at 2,861,000,000 bushels and by the Hungarian Minister of Agriculture at 2,905,000,000. This makes the crop of 1902, with the exception of that of 1898, the largest ever recorded. In 1898 the United States Department of Agriculture estimated the world's crop at 2,942,439,000 bushels. It is estimated that this year the European countries will require to import 378,000,000 bushels, as against 414,200,000 bushels last year, a reduction of 36,200,000 bushels this year. The import requirements of other than European countries are estimated at 52,000,000 bushels for the current year, which will be about the same as they imported during 1901. The estimated crop this year is 164,000,000 bushels above the average for the last five years, and the total surplus of all exporting countries is estimated at 18,000,000 bushels above the requirements of the importing countries. While there are indications of an increasing wheat consumption throughout the world, Beerbohm estimates, from the surplus carried over in different years, that the consumption during the current year will be about 140,000,000 bushels less than this year's production.

The Deterioration of Storage Battery Plates.

In an article printed in the *Electrical World* and *Engineer*, A. L. March sums up his conclusions on the deterioration of storage battery plates as follows:

The lead cell has not received enough attention from its chemical and physical side, most manufacturers having paid more attention to mechanical details, and this has given the battery a rather unbalanced development. However, the manufacturers are now giving more attention to the chemistry of batteries, and we may expect to see in the near future a considerable improvement in lead cells in the way of longer life and greater reliability.

I think the investigations should be directed to methods for securing greater porosity and firmness in the active material of the positive electrode and to improving the electrolyte so as to prevent the formation of lead sulphate, or at least to render it insoluble in all densities of the acid solution, so that it remains in place and can be restored to the proper condition.

Other metals will undoubtedly come into competition with, and may displace, lead in batteries for traction work, but as an auxiliary in electric light and power stations lead cells will probably hold ther own for some time.

Nickel is a strong metal compared with lead. Its peroxide belongs to that class of depolarizers which adds electromotive force to the cell, and in this respect it is the best, so far, that it is practical to use in alkaline electrolytes. The electrolyte permits the use of steel for the grids and the containing vessel, and this gives a construction both light and strong. There seems to be no reason to believe that this cell will not do what Mr. Edison claims for it.

Silver would be a good metal to use in traction batteries if its cost were not so great. To be sure, the silver in a worn out battery would go a long way toward paying for a new set, but the first cost would be rather great. Silver is a rather abundant metal, and ought to be produced for much less than it brings at present, if the demand for it should sufficiently increase.

In the lead cell the active material of the positive is only about half of the weight of the entire plate, so the weight of silver oxide required in the silver cell would correspond to the weight of lead peroxide, and not to the whole electrode. The other materials used would be inexpensive; nickel or steel for the positive grid, and probably iron for both negative grid and active material.

Experiments indicate that a silver battery, giving the same power as a lead automobile battery weighing about 550 pounds, would require only about 70 pounds of silver oxide, and perhaps less. It would not take a very extraordinary reduction in the price of silver nitrate to make the cell practical from a financial standpoint, and for the reasons given above such a cell could be made to have a comparatively long life and high efficiency, and would require but little attention to keep it in working order.

The strike of the machinists at the shops of the Pennsylvania Engineering Works, New Castle, Pa., has been settled and the men have returned to work. They received an advance of about 5 per cent. in wages.

The Helios-Upton Recording Thermometer.

The first instruments for recording temperature were employed mainly for meteorological purposes and were sensitive but delicate in their parts, so delicate that they required very expert attention to keep them running. Then there came the photographic record, where a mercurial thermometer was placed between a light and a sensitized film and the hight of the column of mercury registered on the film, which was moved by a clock. This was even more complicated than the French meteorograph and less satisfactory. Then came the gradual development of the metallic lamina as applied to recording thermometers until we have the new form that has just been put on the market by the Helios-Upton Company, Peabody, Mass., of which we show a cut.

In this form a strip of steel and a strip of brass are brazed together and wound into the shape of a coiled

THE HELIOS-UPTON RECORDING THERMOMETER.

spring. The movement of this is in exact proportion to the increment of heat, through all ranges of temperature. This spring, called by the makers the "lamina," is attached rigidly to the case of the instrument at one end, and the other end carries a long arm, at the extreme end of which arm is a recording pen. A dial properly ruled to hours and fractions is moved by a clock in front of the pen and the motion of the pen is recorded on this dial. There are several special points about this thermometer which are interesting. It can be hermetically sealed and then lowered into liquids of any kind and will record the changes of temperature undergone by the liquid during submergence. The thermometer lamina being surrounded by a solid tube enables the thermometer to be successfully used in moist places, such as greenhouses or steamboats of various kinds. By interposing a length of tube between the lamina and the case carrying the clock and dial it becomes possible to put the thermometer into an oven and keep the recording sheet outside where the heat will not dry up the ink. This makes the thermometer especially desirable for japan ovens as well as for bakers' ovens. It is thus possible to record heats up to 500 degrees F. It is also applicable to oil tempering baths in fine tool making.

The Steel Plant of the Deering Harvester Company.

Some time since, it will be remembered, the Deering Havester Company purchased 30 of the 56 acres of land owned by the South Chicago Furnace Company at South Chicago for the purpose of erecting a steel plant. James Deering of the Deering Harvester Company has been a stockholder of the South Chicago Furnace Company since the organization of that corporation. More recently the Deering Harvester Company have also acquired a large interest in the furnace company, so that while the furnace company and the interest building the steel plant are two separate corporations, for all practical purposes they are one and the same, and this will probably be substantiated by future events, it being intimated that a merging of the two interests will take place, possibly under a new name, in the course of time.

With this end in view the Deering interest acquired by purchase and lease large holdings in the Mesaba district. It is reported that as lessees of the Hawkins mine southwest of Hibbing, Minn., a contract was placed by this interest for stripping 1,250,000 cubic yards of material, being one of the largest contracts of this character ever made in the Mesaba district. The Hawkins property is to be worked both as an open pit and underground mine. The work of shipping from the pit will begin next spring, but the more active working of the underground will not be pushed until a railway spur has been built by the Northwestern line.

Prior to the acquirement of an interest in the South Chicago Furnace Company by the Deering interest preparations had been made for the building of a new furnace, construction of which is now being pushed at South Chicago. The building of three other furnaces is now contemplated and they will probably be taken up in the near future. In addition a contract has been placed with Hoover & Mason for an ore handling system identical with that now in operation at the Illinois Steel Company's plant. It is estimated that between $3,000,000 and $4,000,000 will be expended on the furnaces and ore handling system.

North of the furnace property foundations for the steel plant, which will consist of two Bessemer converters, a blooming mill, bar mill and structural mill, are almost completed. The buildings of the Bessemer plant will cover an area of 100 x 150 feet. The blooming mill will be 300 x 800 feet and the bar mill 300 x 60 feet. The section of land lying west of the present railroad tracks will be used for additional tracks and storage. It is stated that employment will be given to between 2000 and 3000 men when the new plant is in full operation. The cost of the steel plant is estimated at $3,000,000. The plans for the blast furnaces and steel plant have been prepared by Julian Kennedy of Pittsburgh.

The organization of the International Harvester Company is understood to have given increased momentum to the enterprises herein referred to. Just what the capital stock of the new company will be has not been definitely determined.

The Southern Car & Foundry Company's Furnace Plant.—The property of the old Gadsden charcoal furnace at Gadsden, Ala., has been purchased by the Southern Car & Foundry Company, Birmingham, Ala. The furnace had been idle nearly ten years. It was necessary to build a new stockhouse and all other outbuildings, new switch tracks and add much new machinery. The old charcoal ovens have been completely rebuilt, the former ones having been torn away. In addition to rebuilding the old battery, 40 new ovens were added. This plant will be started as soon as the needed fuel and other supplies can be obtained, and then active work will begin on a new furnace by the side of the present stack. When the new furnace is put in operation the company will have a daily output of 150 tons of charcoal iron, the greater part of which will be used by the Southern Car & Foundry Company in their own manufacturing plants.

The American Locomotive Company.

A Very Favorable First Annual Report.

The first annual report of the American Locomotive Company, covering the period from June 15, 1901, to June 30, 1902, was made public last week. The gross earnings for the period under review aggregated $26,398,393.52. Deducting $23,281,216.90 for manufacturing, maintenance and administrative expenditures, there remains $3,107,176.62, which represents the net earnings for the year. After the payment of $105,864.58 interest on the bonds of constituent properties and $1,775,000 on the preferred stock there remains a surplus of $1,251,312.04, which is available for dividends on the $25,000,000 of common stock. President S. R. Callaway in his statement to the stockholders says:

During the first fiscal year of the American Locomotive Company the directors have expended the sum of $1,629,227.90 for additional land, new shop buildings, fixtures, machinery and other machine tools; as a result of which the output of standard gauge locomotive engines of the most modern type has been increased more than 25 per cent. over the combined production of the constituent companies in the year preceding their amalgamation. It will be observed with satisfaction that the percentage of increase in output is far greater than the proportion which the improvement expenditures bear to the cost of the property of this company. It is the intention of the directors further to increase the annual output of the principal plants by judicious expenditures for improvements and additional facilities, payable out of the current income.

Improvements Charged to Surplus.

The expenses include not only a liberal outlay for the maintenance and betterment of the property, but also a charge of $602,151.05 for radical additions and improvements, the combined maintenance, replacement and improvement charges being more than sufficient to take up the theoretical amount required for depreciation on an annual percentage basis.

The surplus of $1,251,312.04 remaining after the payment of full dividends on preferred stock has been carried to the credit of "profit and loss" account; but against the latter there has been charged the sum of $1,027,076.85 for land, new shop buildings, machinery, &c. The directors have considered it wise to charge these improvements against the surplus of current income for the year rather than to carry them to the permanent "cost of property" account of the company.

At each of the company's plants inventories of all of the material, supplies and portable and small hand tools have been very carefully made. These inventories have been subjected to a rigorous and exhaustive verification, with the result that the values of such items, as shown upon the general books of the company, have been more than substantiated.

Results of Consolidation.

It is gratifying to the directors to be able to report to the stockholders that the judgment of the organizers of the company as to the advantages of consolidation has been fully sustained by the results of the year's operations. Among the benefits of combination accruing to the owners of the property the following, with others, have been demonstrated:

Greatly improved facilities, through the infusion of new capital, thereby reducing the direct as well as the indirect labor cost.

The utilization of shop space at the different plants to the best possible advantage, thereby enabling the company to take orders for future delivery with better assurance of their prompt fulfillment.

A minute, constant comparison of manufacturing processes, and the gradual unification of shop methods through the interchange of ideas.

Some steps, at least, toward the standardization of locomotive design.

The reduction of cost through the purchasing of material in larger quantities.

A more intimate knowledge of the detailed costs of engine construction through the adoption of a carefully classified uniform system of accounting.

Policy of the Management Against High Prices.

It has been the aim of the directors to increase the company's profits through the lowering of manufacturing and administrative cost rather than by increases in the selling price of locomotives. The experience of the past year has abundantly demonstrated that this may be done to the mutual satisfaction of the railroad companies and the manufacturer. Except, therefore, so far as may become necessary through the advances in the cost of labor and material, the Board of Directors desire it to be understood that it is not their purpose to advance the selling price of locomotives.

It is, too, the present policy of the company to devote their surplus remaining after the payment of dividends on the preferred stock not only to substantial additions to the property but also in part to the enlargement of their working capital.

The Board of Directors have pleasure in reporting to the stockholders that the outlook for the year 1902-3 is most satisfactory. Contracts for new locomotives in large quantities have been booked for delivery as late as the autumn of 1903, and inquiries continue to be received from every part of the country, as well as from foreign trade, reservation of much of the available shop space having been asked for to the end of the next fiscal year. At the same time it is gratifying to be able to announce that deliveries are being made in substantial accord with the scheduled time.

In the meantime the possibility of economies in organization and manufacturing have by no means been exhausted, and the directors are confident that the close of the next fiscal year will show still further advancement over the record of the period now under review.

The analysis of the income account for the year ending June 30, 1902, is:

Earnings from the sale of new locomotives and extra parts, repair work, the disposition of scrap material, and sundry miscellaneous income		$26,398,393.52
Expenses, including direct manufacturing cost, contingent, shop, local and general expenditures, taxes, insurance, and maintenance, betterment and new construction disbursements in excess of full depreciation requirements		23,291,216.90
Net earnings		$3,107,176.62
Interest on bonds of constituent companies	$77,864.58	
General interest and discount	28,000.00	105,864.58
Profit available for dividend		$3,001,312.04
Disposition of profits—		
Four quarterly dividends, aggregating 7 per cent. on preferred stock	$1,750,000.00	
Additions to property during the fiscal year (balance after charging $602,151.05 to current expenses)	1,027,076.85	2,777,076.85
Balance to the credit of "profit and loss"		$224,235.19

Condensed Balance Sheet.

Cost of property—		
Including all the capital stock of the Richmond Locomotive Works, Manchester Locomotive Works and American Locomotive Company of New Jersey		$45,482,293.27
Securities owned—		
American Locomotive Company preferred stock	$900,000.00	
Richmond Locomotive & Machine Works consolidated mortgage gold bonds	118,000.00	
Sundry securities	37,525.99	1,055,525.99
Convertible assets—		
Cash	$1,153,855.27	
Accounts receivable	4,255,720.52	
Material and supplies (verified by actual inventories of the entire stock)	2,187,566.29	
Contract work in course of construction (based upon exact charges as the work proceeded)	2,874,166.82	10,471,308.90
Securities held in trust—		
American Locomotive Company capital stock held as security for the payment of a mortgage on the Rhode Island works and carried at the face value of such mortgage: Preferred, par value	$250,000	
Common, par value	250,000	
Total, par value	$500,000	
Carried at		200,000.00
Total		$57,209,128.16
Capital stock—		
Preferred	$25,000,000.00	
Common	25,000,000.00	$50,000,000.00
Bonded debt of constituent companies—		
Richmond Locomotive Works	750,000.00	
Dickson Mfg. Company	562,500.00	
International Air Power Company	200,000.00	1,512,500.00
Current liabilities—		
Accounts payable	3,324,907.97	
Bills payable	1,700,000.00	
Unclaimed interest	9,985.00	
Dividends payable July 21, 1902	437,500.00	5,472,392.97
Profit and loss—		
Surplus after payment of dividend on preferred stock	1,251,312.04	
Deduct additions to property actually made and paid for during the fiscal year	1,027,076.85	224,235.19
Total		$57,209,128.16

The Bon Air Coal & Iron Company.

The Bon Air Coal & Iron Company, Nashville, Tenn., are an organization recently formed by the consolidation of the Bon Air Coal Company and the Buffalo Iron Company, both of Nashville. The capital stock is $5,000,000, half preferred and half common. The president is John P. Williams; vice-president and general manager, Jesse M. Overton; treasurer, C. Cooper; secretary, William C. Dibrell, and general counsel, T. M. Steger. The directors are John P. Williams, Jesse M. Overton, W. C. Dibrell, S. J. Keith, A. H. Robinson, M. M. Gardner, J. H. Hall, J. M. Dickinson, Edgar Jones, T. M. Steger and Shade Murray. The Executive Committee is composed of S. J. Keith, chairman; M. M. Gardner, A. H. Robinson, Edgar Jones and W. C. Dibrell. They are largely a home company, most of the stock being owned by parties in and around Nashville.

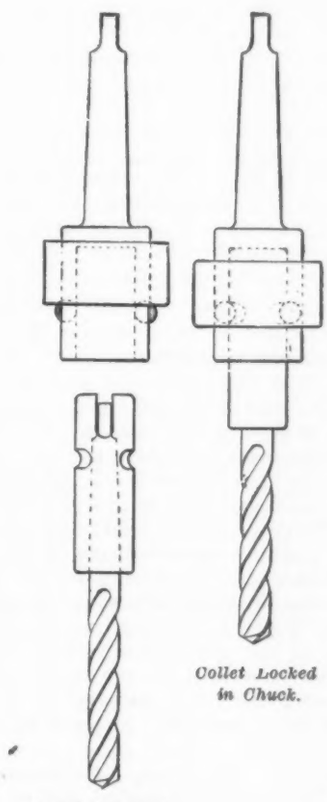
The properties of the Bon Air Coal Company consist of about 40,000 acres of the Bon Air coal vein in White and Cumberland counties, with an average thickness of 4½ to 5 feet. Improvements are being made to greatly increase the output previous to the combination of the two companies. At Eastland, one of their points, a commencement has been made to erect from 400 to 500 coke ovens. The upper vein of coal here, which has been shown by analysis to be of excellent quality for coking purposes, will be mined.

The Buffalo Iron Company's properties, of which the new company become the owners, consist of about 62,000 acres of land in Dickson, Hickman, Lewis and Wayne counties, Tenn. Two brands of iron are made from their ores, one known as the "Mannie," a softener, and the other called the "Wayne," a low phosphorus foundry pig. Two furnaces are now operated at Allen's Creek and two more are being equipped to operate.

Until the consolidation of the two companies the iron company had been getting their supply of coke at Dorchester, Va., 500 miles from their furnaces. Now by the alliance with the Bon Air Coal Company coke of better quality, with quicker and more reliable delivery, has been secured. The number of men employed by the new company is from 1000 to 1500, the principal offices being in the Homestead Building at Nashville, Tenn.

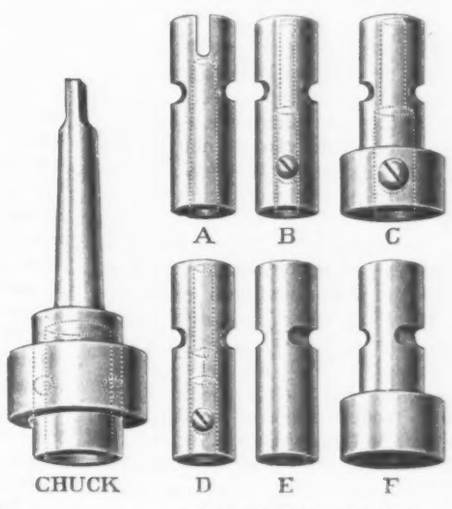
The Seneca Falls Drill Chuck.

A new chuck, designed by A. S. Davis and manufactured by the Seneca Falls Mfg. Company, Seneca Falls, N. Y., is here illustrated. It is intended for use in the spindle of upright drills or lathes, for the easy and rapid change of drills, reamers, taps, &c., without stopping the machine. The chuck consists of a socket piece with two steel balls and a locking ring mounted loosely on the body of the chuck and which may be held in the hand while the chuck revolves in it. The collets are formed with two segmental grooves for receiving the balls, which perform the double duty of holding the collets in place and driving them. To change the collets it is only necessary to raise the locking ring, which instantly releases the balls and allows the collet to drop out, when another can be inserted, and by dropping, or releasing, the ring and the balls roll into place and lock the collet. Owing to the peculiar construction of the chuck and the absence of any projecting part, changes can be made when the machine is running at the highest speed.



Collet Released from Chuck.

Collet Locked in Chuck.



Different Styles of Collets.

THE SENECA FALLS DRILL CHUCK.

Where the National Stock of Gold is Held.—Of the $577,000,000 of gold now held by the Government only $7,655,292 is actually stored in the vaults of the Treasury at Washington. The Sub-Treasury at New York contains $187,523,597 of the yellow metal and the Assay Office in that city $28,723,402, while the mints at Philadelphia and San Francisco are caring for $147,325,363 and $94,305,281, respectively. The Sub-Treasury at Philadelphia has $9,035,557 and the Sub-Treasury at San Francisco $27,751,441. The Sub-Treasurer at Chicago is accountable for $23,868,124; at Boston, $19,035,557; at St. Louis, $10,372,644; and at New Orleans, $5,860,116, and the mint at the city last named holds $1,055,865. The Assistant Treasurers at Baltimore and Cincinnati have in their vaults $6,300,097 and $4,946,290, respectively, and the Assay Office at Seattle is charged with $1,723,708, largely gold bullion received from the Nome and Klondike fields. The remainder of the fund is in the mints at Carson City and Denver, and the assay offices at Boise, Charlotte, Helena, St. Louis and Deadwood, the amounts ranging from $660,237 at Denver to $1448 at St. Louis.

A cable dispatch from Melbourne, Australia, reports that the Federal Senate has finally passed the Australian tariff bill in a compromise form. The most interesting feature to the United States is the reduction of the duty on machinery to 12½ per cent.

The Harvesting Machine Industry.

History of the Great Industry Now Consolidating.

BY R. L. ARDREY, CHICAGO.

Harvesting machines have exerted a most profound influence upon the affairs of men in the past century. A man can only produce as much wheat as he can reap and the harvest season is very short, nature allowing but a few days in which her most precious and beneficent crop may be gathered. With the sickle a man could reap and bind perhaps ½ acre per day; with the cradle 1 to 2 acres, allowing time for the work of binding. The twine binder reaps and binds 15 to 20 acres in a day, and the man who operates it rides on a comfortable spring seat. Under the *régime* of the sickle nearly all the productive labor of wheat growing nations was absorbed in agriculture and the development of great manufacturing industries was impossible for lack of labor and for lack of customers. An important exception might be noted in England, where the weaving industry had been developed on an extensive scale, but this was possible because in England wheat produces twice as much to the acre as the average yield of other countries, and hence less labor was required to provide bread for the English people and more was available for other occupations. In the United States nearly 80 per cent. of our population lived on the farm in 1840 and we had not yet emerged from the log cabin stage of our nation's history.

Until a comparatively recent period agriculture was the occupation of slaves. It was only by slave labor that the ruling classes in ancient empires were able to obtain bread for their armies and domestic establishments. The transformation from the Roman to the feudal system relieved the farmer of Western Europe from the lash of the master or overseer, but in other respects his position in society was only a little higher than that of the horse. In America the farmer acquired full civil rights and was able to enjoy all the fruits of his labor. Land could be had at nominal cost, and every industrious man who wanted a farm had only to go forth with his axe and plow and make a home where the virgin soil beckoned him. With all these advantages, however, the farmer did not prosper, as we reckon prosperity in these modern times of wealth. The colonist could produce an abundance to eat, his wife or his neighbor could supply him with coarse homespun clothes, and the entire community could join in a happy log rolling to clear his land or build him a house, but beyond this he could not go. With the rude home made implements that belonged to the age of the sickle a man could not produce a surplus, and hence could not acquire wealth or a cash income that would enable him to buy the products of modern factories. In the South, where slave labor was available, the planters lived in luxury, but the Northern farmer, excepting for his abundance of food, was a man of poverty, who toiled from sun to sun and enjoyed but few of what we now look upon as the comforts of life. During the age of the sickle farming was an occupation. Harvesting machines and other labor saving inventions have made agriculture a business in which a man can produce a surplus far beyond his own wants—a surplus which he can exchange in the world's markets for cash or for the products of a thousand factories.

Cyrus H. McCormick, Inventor of the Reaper.

The harvesting machine industry began with the invention of the reaper in 1831 by Cyrus H. McCormick of Rockbridge County, Va. Robert McCormick, his father, a wealthy planter, had made a number of experiments, beginning as early as 1816, in an effort to construct a practical reaping machine, but these experiments had ended in failure. Cyrus, his son, then coming to manhood, took up the work in 1831 and carried it on to success.

Many English writers have endeavored to claim for their countrymen the credit that we give to McCormick for this epoch making invention. If the honor belongs to the man who first tried to invent a reaper English inventors could undoubtedly establish priority over McCormick, but this is not the standard by which we measure inventions. It is curious to note that nearly all the English inventors who applied for patents prior to 1831 proposed to cut the grain with circular knives or saws, the same principle that Robert McCormick tried in his first experimental machine in 1816. Credit is also claimed for two other English inventors, neither of whom ever applied for a patent. Their inventions, like all the other conceptions of inventors of their period, need not be considered by any one familiar with the essential principles of a harvesting machine, as they were not practical, and nothing more was heard of them until McCormick appeared at the London Exposition in 1851 with a reaper that would reap.

When we look back over the wilderness of patents on harvesting machines that has become visible to us in the past 70 years it is remarkable that a young planter's son like Cyrus H. McCormick, with nothing to guide him except the failures of his father, should have been able to embody in his first machine the foundation principles of all modern reapers and harvesters. These were the balancing of the frame on two wheels, one of which was geared to furnish power to the moving parts; the reciprocating knife, moving through or over fixed fingers, actuated by a crank; the platform to receive the grain as cut and hold it until a gavel had been gathered, and, most important of all, the arrangement of a stationary divider and a revolving reel in such a manner as to separate the grain to be cut from the standing grain and lay it in a flowing swath upon the platform.

The Constructive Genius of McCormick.

McCormick's invention seems very simple to us now when we look back and review the additions and improvements that have been made to bring harvesting machines to their present standard, but we must remember that McCormick occupied the position of a pioneer. We might say that 100 years ago the world was blind in its mechanical eye. A few men like Watt, Stephenson, Fulton, Whitney and Arkwright had acquired the power of sight in their respective fields of invention. A score of men had seen a glimmering of light in the direction of harvesting grain mechanically, but the honor was reserved for McCormick to look upon the problem with the clear eye of the constructive genius, and his business acumen and determination led him to toil on at his invention until his vision had become a reality and he was able to manufacture and sell machines in large numbers.

During the early history of harvesting machines it required about as much genius, and of an entirely different order, to establish the manufacture of an invention as to conceive and work out experimentally the invention itself. There were no factories then with staffs of experienced master mechanics to put all the details of an invention in shape and to give each part the requisite strength, at the same time preserving the necessary economy in weight for a machine that must be drawn by horses. The difficulty in obtaining the necessary variety of materials was a staggering one in itself. So insurmountable did these obstacles appear that Mr. McCormick, after patenting the reaper in 1834, was persuaded to abandon his invention and go into partnership with a neighbor in establishing a blast furnace. Probably the difficulty of obtaining iron for making reapers led him to believe that it would be a wise step to be able to make his own iron and thus obtain an important advantage in putting his invention on the market. The blast furnace, however, did not prove profitable and was closed out five years later. Mr. McCormick then, in 1839, returned to the problem of the reaper, and thereafter gave his long and active life to the development and manufacture of harvesting machines.

In the year book of the Department of Agriculture for 1899 appears a statement regarding Mr. McCormick's first steps in manufacturing which throws a strong light upon the obstacles that the pioneer manufacturers had to surmount, as follows:

When agricultural machinery began to be manufactured at Walnut Grove, Va., great difficulty was experienced in procuring some of the material, which had to be brought from a distance.

Neither was it easy, when the machines were manufactured, to get them to market. Sickles were made 40 miles away, but as there were no railroads and but few highways fit for wagons, the blades, 6 feet long, had to be carried on horseback. It was soon realized that while reapers were luxuries in Virginia and the East, they were a necessity in Ohio and Illinois and on the plains of the great West. When it was discovered that the West was the natural market for these agricultural machines, the next and most difficult question was that of getting them there. The question was finally solved by shipping the first consignment, in 1844, by wagon trains from Walnut Grove to Scottsville, Va., thence down the canal to Richmond, thence by water down the James River into the Atlantic and around Florida into the Gulf of Mexico, thence by way of New Orleans up the Mississippi and Ohio rivers to Cincinnati, Ohio.

Finding it impracticable to establish the manufacture of reapers on a successful scale in Virginia Mr. McCormick had 100 machines made at Cincinnati in 1845, under the supervision of his younger brother, Leander J. McCormick. The next year, 1846, Cyrus H. McCormick went to Brockport, N. Y., where he built 100 reapers in the Globe Iron Works, owned by Seymour & Morgan. In 1847 Mr. McCormick removed to Chicago and made 500 machines the first season, locating there permanently and building up the great industry which has made the name McCormick a household word throughout the world. Seymour & Morgan, however, continued to manufacture reapers at Brockport. In later years the firm became D. S. Morgan & Co., but the business was wound up a few years ago. Mr. Seymour still lives in Brockport, having recently celebrated his one hundredth birthday. He has the honor of being the oldest living reaper manufacturer in the world and the only man now living who was engaged in the industry prior to 1850.

Obed Hussey Another Pioneer Inventor.

Obed Hussey was a noted inventor who enjoys the distinction of being the only American rival to McCormick for the honor of inventing the reaper. Hussey invented and built his reaper in 1833, operating it successfully in the harvest of that year. His patent antedates that of McCormick, bearing date of December 31, 1833, while McCormick's patent was not issued until June 21, 1834. Inventions, however, are reckoned by the date when they are conceived and put into successful operation, and this gives McCormick two years' priority over Hussey. The notable feature of Hussey's machine was the use of a "scalloped" knife, made in triangular sections which were attached to a back or bar, this knife running through slotted guards or fingers. McCormick in his first machine used a straight knife, which was later given a serrated or sickle edge, and his guards were given a spear head shape, so that this sickle would cut against the rear shoulder, holding the grain in an acute angle. In 1847 Hussey patented an improvement on his guard, in which the upper part was cut away at the rear so that the grain as it passed over would sweep out the trash that had tended to accumulate in the slot. Guards and sections of the Hussey type are now in universal use in all harvesting machines. McCormick's device, however, worked successfully and was used by him for a number of years in thousands of machines that he manufactured.

The real distinction between the inventions of McCormick and Hussey is that one was essentially a reaping machine, while the other was essentially a mowing machine. There are four vital elements in a reaper—vital in the sense that if any one of them be omitted the machine will not be practical for general use. These are the reciprocating knife, the platform, the reel and the divider. McCormick was the first inventor to embody these four vital elements in practical form in one machine. Hussey had only two of them in practical form, the reciprocating knife and the platform, and while his machines were sold and used to a limited extent as reapers, they were not practical for general use as reapers; just as McCormick reapers were used to a limited extent as mowers, but were not practical as compared with advantages which the Hussey type of machine possessed as a mower. There are two problems in reaping or harvesting grain; first, the cutting and, second, the handling of the grain in such a manner as to keep it straight and in shape for binding. McCormick's success where other inventors, including his father, had failed, was due to the fact that he mastered the problem of dividing the swath from the standing grain and reeling it in and laying it by a positive and simple action upon the platform. Hussey seems never to have comprehended the importance of this half of the problem of reaping, but confined his attention almost entirely to his devices for cutting. Grain is easy to cut but difficult to handle. Grass is hard to cut but requires no handling. Grain can only be harvested successfully by using the devices for handling it that are peculiar to the McCormick invention; grass can only be cut successfully by using the cutting mechanism of Hussey.

Hussey the Inventor of the Mower.

Those who have sought to give to Hussey the credit for the invention of the reaper, overlooking the great honor to which he is unquestionably entitled as the inventor of the foundation features of mowing machines, seem to have echoed the great mistake which Hussey himself made during his life. Instead of developing his machine and securing its general introduction as a mower, he persisted all his life in unprofitable efforts to introduce it as a repaer. He, in fact, never made any money out of his inventions until, two years before the expiration of his patent of 1847, a syndicate of patent lawyers bought the patent, paying him $200,000. A few years before Hussey had made application to the Court of Claims for a reward from Congress for his invention, making the statement that after years of hard and continuous work in the introduction of his machines he was not worth to exceed $500 above his liabilities.

In the general construction of the two machines, aside from their working devices, the distinction between them, the one as a reaper and the other as a mower, is equally clear. McCormick balanced his reaper on two wheels, one at the stubble end of the rigid frame, the master wheel, and the other at the grainward end, the grain wheel, so that his reaper could be maneuvered in the field like a cart, and this plan is followed in all modern grain harvesting machines. Hussey, on the other hand, had a two wheeled truck, in form substantially like the truck of modern mowers, in place of the one master wheel of McCormick; and in addition to the grain wheel it was necessary to have a caster wheel at the rear to support the platform. This made the Hussey machine, as a reaper, difficult to maneuver in the field, as well as more expensive to manufacture.

Leaving off the two superfluous wheels and the platform, the Hussey machine embodied the foundation principles of a mower. His bar could be connected to the main truck by a hinge, so that the outer end could rise and fall and conform to the inequalities of the ground, an essential feature of a mower, which must cut close to the ground in order to get all the grass. It was unfortunate that Mr. Hussey was unable to reap a financial reward more commensurate with his merits as a pioneer inventor. He did not live to enjoy the fortune which he finally received for his patent on the "open back" guard, as he lost his life in a railway accident a year or two later.

Great Progress Made from 1850 to 1860.

The ten years following 1850 were years of great progress in the manufacture of reapers and mowers. A few pioneers had tapped the great, inexhaustible fountains of American inventive genius, and a stream of labor saving agricultural inventions poured forth to lighten the burdens of those who produce the world's bread. New factories were established in all parts of the country, each based on some improvement upon or variation from the prevailing types of harvesting machines. The oldest enterprise, next to the McCormick Company, was established at Springfield, Ohio, in 1850, by Benjamin H. Warder, which grew into the Warder, Bushnell & Glessner Company, who have made the Champion harvesting machines famous throughout the world. William H. Whitely, a farmer's boy, also came to Springfield early in the '50s and began making reapers, his enterprise growing into the Whitely, Fassler & Kelly Company, who at one time, about 1880, operated the largest agricultural machine works in the

world, the firm going out of business in 1886. The late Walter A. Wood established at Hoosick Falls, N. Y., the business which grew into the Walter A. Wood Mowing & Reaping Machine Company, and D. M. Osborne laid the foundations at Auburn, N. Y., for the great business of D. M. Osborne & Co. In the West, Emerson, Talcott & Co. of Rockford, Ill., made the Manny reaper famous, but in recent years they have confined their attention to mowing machines. Ball, Aultman & Co. of Canton, Ohio, who were eventually succeeded by Aultman, Miller & Co. of Akron, Ohio, also began during this period, they having been the pioneers in the manufacture of "hinged bar" mowers. This practically covers the list of reaper manufacturers who began prior to 1860 and are still doing business successfully.

William F. Ketchum of Buffalo, N. Y., was the first to manufacture mowers which were designed exclusively for cutting grass, his machine being made with one drive wheel and a rigid bar. Lewis F. Miller, who was then connected with the firm of Ball, Aultman & Co. (licensees of Hussey), but later became the head of the firm of Aultman, Miller & Co. at Akron, is recognized as the inventor of the "hinged bar" type of mower, which, with improvements, is now in universal use. Following the general plan of construction of the Hussey machine, which his firm were building, Mr. Miller designed his mower with two drivers, and the bar was hinged and so attached to the frame of the truck that it could be raised entirely by means of a lever to pass obstructions or for convenience in turning at corners, and the inner and outer end could rise and fall independently when cutting, so as to float over the ground and conform to the inequalities of the field. The main features of this machine were patented in 1858. By this time, however, so many patents had been issued on reapers and mowers that it was found that many of the features of the Miller hinged bar had been anticipated by prior inventors, and while this did not detract from the historical credit that is due to Mr. Miller as the man who perfected the "hinged bar" mower, it created many difficulties for his firm, as manufacturers, especially when they attempted to collect royalties from other firms or damages for infringement of their patents. As a result of this conflict of interests the famous "hinged bar pool" of patents was organized, under the leadership of Cornelius Aultman, who was one of the shrewdest of the reaper and mower manufacturers of his day. The conflicting patents were bought or merged in this "pool," which eventually collected more than $1,000,000 in royalties and settlements from other manufacturers. This was probably the largest sum that was ever realized from patents by any one interest in the harvesting machine industry.

The Combined Reaper and Mower.

The "combined" machine, combining a reaper and mower in one, seems to have been the foremost idea in the minds of a majority of the manufacturers of this period. The correct plan of construction in a reaper or harvester is to make the frame and cutter bar rigid, so that the machine must be raised and lowered on its supporting wheels to change the hight at which the bar cuts. In a mower, however, the bar must be attached flexibly to the frame, so it will float closely over the ground, and great difficulty was found in reconciling these two requirements in one machine. When mowers were improved by the construction of a double hinge in the bar it was found that the bar could be raised permanently to any hight desired for cutting grain. The platform, grain wheel divider and reeling or raking attachments could then be put on, these devices being so constructed that the farmer could readily attach them for reaping or take them off again to convert the machine into a mower. In some cases the McCormick type of reel was used, the same as in modern harvesters, but the reel rake, which is now used on reapers, became the most popular on combined machines. In the reel rake each rake is attached at one end to a central, revolving rake head, the outer end of the rake or arm being left free to describe an eccentric circle, under control of a roller bearing which runs on a track on the rake head. The inventor who put this device in practical form was Samuel Johnston, founder of the Johnston Harvester Company of Batavia, N. Y., but the leading manufacturers were the Champion interests of Springfield, Ohio. The efforts of William N. Whitely were directed for nearly 30 years to the improvement of combined machines. He was an exceedingly practical inventor, and his East street shops in Springfield, as before stated, became noted as the largest agricultural machine works of their day in the world, and Springfield had besides two other large manufacturers operating under a division of territory on Champion patents. One of these three concerns, the Warder, Bushnell & Glessner Company, have since recovered much of the ground that was lost by the unfortunate failure of the Whitely interests in 1886.

Introduction of the Header.

While these great improvements in reapers and mowers were in progress a new type of harvesting machine came to the front in the West, and continues in use to the present day wherever the climatic conditions are favorable. This was the "header," a machine which merely "topped" the wheat, leaving the straw on the ground. The pioneer inventor in this field was George Esterly of Wisconsin, who, until his death a few years ago, was one of the leading manufacturers of headers. Esterly's first patent in 1844 showed merely a box mounted on wheels and pushed by horses from the rear —a wide "push cart"—with a stationary knife in front and a rotating reel with beaters which carried the grain against the knife and swept the heads back into the box. In later patents a platform canvas is shown, which carried the heads to one side, and a canvas elevator which delivered them into a wagon driven alongside. Jonathan Haines of Illinois was also a pioneer in this field, and made many improvements which made Haines' Illinois harvester a very popular machine in its day. Several thousand "headers" are now sold annually in the far West. They are fitted with the same cutting apparatus as a harvester, and generally cut 12 or 14 feet, twice the width of harvesters in common use—a machine being pushed by four to six horses.

In California and in portions of Oregon and Washington "combined" harvesters are used which harvest and thresh the grain at one operation. These machines, which are drawn by horses or by traction engines, combine the "header" with a threshing attachment, cutting a swath of 12 to 40 feet, and delivering the threshed wheat in bags which are dropped in the field. While these machines have only come into use in the past 20 years the main principles embodied in them are shown in a patent granted in 1836 to Moore and Hascall of Michigan, who endeavored to introduce them at that early period, but found the climate an insuperable obstacle.

These are probably the most economical harvesting machines in use to-day, but they can only be employed where the harvest season is dry.

The Marsh Harvester.

The year 1858 marked a turning point in the art of harvesting grain. In that year C. W. and W. W. Marsh of Shabbona Grove, Ill., invented and built a machine for which they adopted the name "harvester," to distinguish it as a type from the reapers then in general use. It was so constructed that two men could stand on it and bind the grain as fast as it was cut, dropping the bound bundles behind them on the ground or on a bundle carrier. Several manufacturers were then putting out "self raking" reapers, which raked the grain off in gavels mechanically, thus requiring only a man to drive the machine, but most of the reapers in use at this time were of the old hand raking type, and required a man to drive and another to stand or sit on the machine and rake off the gavels from the platform with a fork or hand rake. The Marsh Brothers constructed their machine with an endless conveyor on the platform, and an elevator with a "band of rakes," so that the grain, as it was cut and fell on the platform, was carried to one side and elevated over the master wheel into a receptacle. Two men stood on a platform or foot board arranged on the outside of the machine and bound the grain as fast as it was delivered to them, each taking

a gavel from the receptacle and binding it on a table at his side. With this "harvester" two men and a boy could harvest and bind 8 to 12 acres per day, and this meant an enormous saving in labor as compared with the reaper, which usually required five men to follow it and bind on the ground. In 1860 the Marsh Brothers undertook to build 12 of their harvesters for sale to their neighbors, but they encountered obstacles which have usually proved fatal to inventors of agricultural machines. With no plant of their own and no experience in manufacturing their machines proved to be poorly built, and would not stand up in the field. Baffled and financially embarrassed, but not vanquished, they built another experimental machine at Plano in 1861. This machine worked well, and they decided to run it for several years before undertaking again to manufacture harvesters. They had learned by sad experience that a machine which works well in the hands of its inventors, who know how to handle it and keep it together, is a different proposition from the construction of machines that are to be put out in the hands of farmers, who are seldom skilled mechanics, and who will drive a "new fangled" invention into the fence corner and have nothing more to do with it if it gives them any trouble. In 1864, however, the Marsh Brothers considered their harvester sufficiently developed for the test of sale, and 26 machines were built for the harvest of that year, which stood up well and gave satisfaction to the farmers who bought them. They had formed a partnership with Lewis and George Steward of Plano for the manufacture of these machines, and this eventually grew into the great manufacturing business of the Deering Harvester Company of Chicago, who in recent years have stood on an equality with the McCormick Harvesting Machine Company, each making nearly a third of the harvesting machines of the world.

The Once Famous Field Trials.

"Field trials" were the great battle grounds of the harvesting machine industry a generation ago. "For ways that are dark and tricks that are vain," the heathen Chinee and modern horse trainers and jockeys are mere innocent babes as compared with the experts who used to represent the reaper companies and operate their machines in these great contests. The farmers in a radius of 25 to 50 miles would gather at these events, inspired by a practical desire to keep pace with the progress of the manufacturers, as well as the love of a tremendous competition in which the contestants did not resort to violence. It was always a serious matter for the manufacturer, especially since "the boys" had a way of conspiring to beat McCormick, or whoever had the lead in the trade of the community where the trial was held. Victory depended as much upon the personal and entertaining ability of the manufacturer's staff of men as upon the work of his machine, but the latter was always managed by experts who could astonish the natives by the wonders that they performed.

At one of these famous "field trials," held at Dekalb, Ill., in 1864, one of the Marsh harvesters that had been built at Plano that year made its appearance. W. W. Marsh, one of the inventors, rode alone on this machine and cut and bound an acre of wheat in 55 minutes. Shortly after this trial Easter & Gammon of Chicago obtained a license from the Marsh Brothers to manufacture and sell their harvesters in six of the principal States. They were experienced reaper men, and under their leadership the Marsh harvester soon became recognized as a successful and practical machine. Two years later Easter & Gammon dissolved partnership and divided their territory, Mr. Gammon having his machines built at Plano by Marsh Bros. & Steward, while Mr. Easter had his machines built at Rockford, Ill., by Emerson, Talcott & Co.

William Deering Engages in the Business.

In 1870, William Deering, then of Portland, Maine, who had been a financial backer in part for some years, became a member with Mr. Gammon of the firm of Gammon, Deering & Steward, later Gammon & Deering.

Mr. Deering, before becoming interested in the harvester, had been very successful as a manufacturer, and had accumulated what was regarded 30 years ago as a comfortable fortune. The harvester needed capital, and it also needed the commercial genius which Mr. Deering was able to supply. He at once became the leader among the group of men who were interested in the machine, and under his shrewd, conservative direction the business grew by leaps and bounds. Rights for other States were added to their territory from time to time by arrangement with the Marsh Brothers, and after 1877 Gammon & Deering took over the business of J. D. Easter and the manufacturing interests of the Marsh Brothers in the harvester, the Marshes having some years before established a factory at Sycamore, where they had manufactured machines for J. D. Easter & Co. for territory controlled by themselves and by that firm.

The Automatic Binder.

While the manufacture of Marsh harvesters grew to large proportions, about 100,000 machines having been sold during the life of the Marsh patents, this business proved but the introduction to the enormous industry that has since grown up in the manufacture of the harvester and binder. The problem of binding grain mechanically had long engaged the attention of inventors, the first patent on an automatic binder having been granted as early as 1850. Some of the devices shown in these early patents were later incorporated in wire and twine binders, but it was not until after the introduction of the Marsh harvester that successful binders made their appearance, and then only as attachments to this machine. The leading wire binders were the Locke, made by Walter A. Wood; the Gordon, made by Gammon & Deering, and the Withington, made by McCormicks.

It is a curious fact that it would cost more to harvest grain with a wire binder, or even with machines using twine, than with a Marsh harvester, yet the demand for automatic binders was such that for many years after their introduction the manufacturers could not supply the demand. As one of the pioneers of that period has explained, what the farmers wanted was facility in the work of harvesting. Labor was becoming scarce on the farms, and the farmer wanted a machine that would make him independent, so that he could cut and bind his crop himself. Prior to the Civil War there had been an abundance of labor available for agriculture, but at the close of the war the men who were discharged from the service preferred to go West and make homes for themselves under the military homestead law. Even as late as 1880 there was an abundance of land awaiting settlement, and the prospect of acquiring a farm was more inviting to the young man of the Central States than the life of an agricultural laborer or renter. This demand for automatic machines was a great stimulus to the efforts of inventors, and the trouble that was encountered in the use of wire which remained in the straw, as well as in the threshed grain, directed attention to the possibilities of using cord or twine.

The Twine Binder.

Many inventors contributed to the combination of ideas that make up a practical twine binder, but Marquis L. Gorham and John F. Appleby carried the work on to success. Gorham's patent was issued in 1875, and had he lived it is probable that he would have done much to solve the problem of a practical twine binder, as he was an experienced inventor in the designing of agricultural implements and machines. Death cut short his career, however, and it was left to Appleby to perfect the machine that swept the harvest fields of the world under the name of the Appleby binder. Mr. Appleby's first patent on an automatic binder (using wire) was issued in 1869, but it was not until eight or nine years later that he was able to build a machine that would work successfully with twine. William Deering had been watching his experiments closely, hoping that they would offer a solution of the great problem of binding grain in a more satisfactory manner than with wire. Two of the machines built by Mr. Appleby for him were operated by Mr. Deering through the harvest of 1878, under an agreement which in the fall of that year, 1878, was put in writing, giving Mr. Deering rights under the

Appleby patents. About 100 Appleby binders were built by Gammon & Deering in 1879, preparatory to putting the machines on the market in large numbers the following year.

The firm of Gammon & Deering dissolved partnership in 1879, Mr. Gammon retiring with a fortune of about $1,000,000. Mr. Deering, finding that the shops at Plano, Ill., where their manufacturing operations had been carried on, were inadequate and could not be enlarged materially because of their location in the center of the town, besides the lack of railroad facilities, decided to remove to Chicago, and accordingly bought a large tract of ground at Clybourn and Fullerton avenues, on the north branch of the Chicago River, where the great plant of the Deering Harvester Company is now located. The following paragraph, descriptive of the difficulties which he had to overcome and his final triumph, is from the pen of C. W. Marsh, editor of the *Farm Implement News* of Chicago, who was one of the inventors of the harvester and had been for many years associated with Mr. Deering:

The year 1880 was a memorable one in the annals of the harvesting machine business. The old hand binding harvester had been pushed from its place in the market by the child of its adoption, the automatic binder, several styles of which binding with wire were built and successfully put upon the market to supply a large and growing demand. Mr. Deering was now the sole representative of the vast interests of the old concern, and he was making two bold movements; he was building new shops in Chicago, and removing his works thereto from Plano, thus changing his base and reforming his front in the face of the enemy, and he was preparing to make a charge directly upon the center of the opposing hosts. The position was dangerous and required a leader of judgment, nerve, great executive ability and force of character. These attributes Mr. Deering possessed. The campaign of 1880 ended in complete success; his Appleby binders—manufactured and put upon the market from shops on wheels, so to speak—swept everything before them. The harvest of that year was a Waterloo defeat for the wire binders, and "*Sauve qui peut*" might well have been the cry of the leaders thereafter as they rushed for cover under the Appleby patents. Mr. Deering won a complete victory; he established twine binding machines as the grain harvesters of the time, and of the future, and himself as the acknowledged leader in the movement.

With this auspicious introduction of the twine binder the Deering establishment soon became one of the two greatest works in the world for the manufacture of labor saving farm machines. The harvester of 1858, rudely constructed by two farmer's boys, with the aid of castings from an old reaper, was an acorn from which a giant industrial oak has grown. Step by step the labor of the harvest field has been lightened by Deering improvements and inventions, until the world has demanded each year more than a quarter of a million Deering harvesting machines. The organizing genius and executive ability of William Deering have been ably seconded by his sons, Charles and James Deering, and, in recent years, his son-in-law, Richard F. Howe. After 30 years of titanic labor William Deering withdrew the first of the present year from the Deering Harvester Company, transferring his interest to his sons and to Mr. Howe, carrying with him the respect and admiration of the world for the "grand old man" of the harvesting machine industry.

Numerous Competitors Spring Up.

This great industry, however, is much like the Western Continent, in the sense that one man could discover it, but one man cannot conquer or rule it. Mr. McCormick, who gave to the world the reaping machine, found, when he went forth into the field with his great invention, a host of antagonists who did not hesitate to challenge him to mortal commercial combat, and who showed themselves ever ready to make improvements upon his own weapon. Mr. Deering, in like manner, in his hour of triumph in the introduction of the Appleby binder, found himself pitted against the great McCormick Company, who bought the Gorham patents, as well as some 20 other manufacturers, who took licenses under the Appleby patents. The McCormick Company, in particular, have been noted for their ability to keep pace with or in the van of all great improvements in this industry. When they began building harvesters of the Marsh type in 1875 they made many improvements in the machine, the most important of which was the use of canvas aprons instead of the "band of rakes" which had been used by the Marsh interests. Their wire binder was the most successful machine of its type. It is estimated that a few years before the invention of the Appleby binder there were nearly a hundred manufacturers of reapers and mowers in the United States. Only 22 concerns equipped themselves for the manufacture of twine binders, the remainder, with a few exceptions, soon dropping out of the field. A few years after the introduction of the twine binder the great change in construction was made from wood to steel, and the cost of the shop equipment for making steel machines was so great that there was a further reduction in the ranks, until to-day there are only 12 manufacturers of binders in the United States. Of these the McCormick and Deering companies are by far the largest, each of these two great establishments having made nearly a third of the world's harvesting machines in recent years. Next to them come in the order named the Warder, Bushnell & Glessner Company of Springfield, Ohio; the Plano Mfg. Company, located at Plano, Ill., the home of the harvester, until 1893, when they removed to Chicago, and the Midwaukee Harvester Company of Milwaukee, Wis. These five are the companies that have recently been merged in the International Harvester Company. The Warder, Bushnell & Glessner Company were founded at Springfield by the late Benjamin H. Warder. Gen. Asa S. Bushneli, who recently filled with credit to himself, as well as to the State, the office of Governor of Ohio, is president; he and J. J. Glessner of Chicago, the vice-president, being the principal owners. The Plano Mfg. Company were established at Plano, Ill., in 1881, by W. H. Jones, E. H. Gammon and Lewis Steward, and operated the plant which had been vacated by Mr. Deering's removal to Chicago until they, too, outgrew the facilities of the shops and removed to West Pullman, in Chicago.

There are seven manufacturers of binders who are not included in this great consolidation, as follows:

Acme Harvester Company, Pekin, Ill.
Adriance, Piatt & Co., Poughkeepsie, N. Y.
Aultman, Miller & Co., Akron, Ohio.
Johnston Harvester Company, Batavia, N. Y.
Northwestern Grass Twine Company, St. Paul, Minn.
D. M. Osborne & Co., Auburn, N. Y.
Walter A. Wood Mowing & Reaping Machine Company, Hoosick Falls, N. Y.

The Emerson Mfg. Company of Rockford, Ill., and the Richardson Mfg. Company of Worcester, Mass., and a number of smaller concerns are engaged in the manufacture of mowers on a considerable scale. There has been, however, an enormous development of the mower business of the five "international" companies in the past ten years. The introduction of roller and ball bearings in the Deering mower has been well matched by improvements in the McCormick machine which give it unsurpassed efficiency and durability, and the two companies probably do nearly ten times the business in mowers that they had 10 or 15 years ago.

Corn Harvesting Machines Now a Success.

The introduction of successful corn harvesting machines has been the great event of the past decade in this industry. Both the McCormick and Deering companies experimented for many years with inventions for cutting and binding the corn crop, and both had machines on exhibition at the Columbian Exposition which did fair work in the field trials. Recently, however, this business has attained large proportions, and the two pioneer companies will probably do a business the present season in corn harvesters aggregating several millions of dollars. The acreage of corn in the United States is nearly double the acreage of wheat, and it would not be surprising if the output of corn harvesters, in the course of 10 or 20 years, would exceed the number of grain binders sold in the United States.

It would be rash to make any prophecies of the future of the harvesting machine industry. The past 50 years have shown a continual expansion, some new development arising at every stage to carry it on to new triumphs. When Cyrus H. McCormick, the founder of the McCormick Harvesting Machine Company, was summoned to the harvest of the Infinite Reaper in 1884 he could look back over a long and eminently

successful career, and the great establishment which he had built up seemed like a colossal monument of industry which his successors would be fortunate to maintain. Yet under the administration of his son, Cyrus H. McCormick (who becomes president of the International Harvester Company), assisted in recent years by a younger son, Horace F. McCormick, as vice-president and general manager of the company, the output of the McCormick Works has increased about five fold; and the business has been so extended throughout the world that, in all of our seasons of the year, from January to December, the last rays of the setting sun cast their benediction upon some modern harvest scene where slaves of steel, bearing the name of that great master, McCormick, are employed in the beneficent work of harvesting the world's bread.

Canadian Notes.

The Pig Iron Bounty Case.

TORONTO, September 13, 1902.—The action of the Dominion Iron & Steel Company against the Crown, which was to have been taken up on the 8th inst., was postponed until the 18th. Some witnesses from the United States will probably be examined by commission.

Bounties as a means of encouraging iron and steel production in Canada were resorted to by the late Conservative Government. Hon. Geo. E. Foster, Finance Minister under Sir John Macdonald and succeeding Conservative premiers, receives the chief credit on censure for them. Himself a Nova Scotia man, and the iron and steel industry being confined in the eighties almost exclusively to Nova Scotia, he was supposed to be actuated largely by local feeling. As time went on it was found expedient to modify the system which had previously favored the product of domestic ores solely. The known deposits of Nova Scotia ores did not yield a raw material in all respects suitable for the production of the kind of iron required by the market. The deposits of Bell Isle, which had recently passed into the possession of a Nova Scotia iron company, were found to be superior to those at home. Mr. Foster's bounty conditions were altered, so as to enable bounties to be earned on pig iron which was partly of home and partly of foreign composition. This facilitated the use of Newfoundland ore, which comes from outside of Canada. About the same time the Hamilton Blast Furnace Company started up in Ontario, working largely on ore brought from Michigan.

In 1896 the present Government came into office, and in 1897 it introduced an act, which Parliament passed, still further altering the bounty arrangement. The bounties were made more liberal, this change in them being intended to offset the reduction made the same year in the duty on pig iron. The act provided that the bounties on iron and steel were to be as follows:

1. On pig iron, $3 per ton on the proportion produced from Canadian ore, and $2 per ton on the proportion produced from foreign ore.
2. On puddled bars manufactured from pig iron made in Canada, $3 per ton.
3. On steel ingots, 50 per cent. of whose weight is the product of pig iron made in Canada, $3 per ton.

The above mentioned bounties were to be paid during the five-year period ending April 23, 1902.

In August, 1899, an act was passed providing for the continuance of bounties for a second five-year period, beginning upon the expiration of the first. Under it there is to be a gradual scaling down of the bounties. It provides:

1. That from April 23, 1902, to June 30, 1903, the bounties shall be 90 per cent. of the rate fixed by the act of 1897.
2. That from July 1, 1903, to June 30, 1904, they shall be 75 per cent. of that rate.
3. That from July 1, 1904, to June 30, 1905, they shall be 55 per cent. of that rate.
4. That from July 1, 1905, to June 30, 1906, they shall be 35 per cent. of that rate.
5. That from July 1, 1906, to June 30, 1907, they shall be 20 per cent. of that rate, ceasing with the latter date.

Consequently the bounties on pig iron and steel are now, and will be until the end of next June, 90 per cent. of the original rates. Steel entitled to a bounty must have in its composition Canadian made pig iron equal to 50 per cent. of its weight.

The present case has beeen brought on as a result of the extreme scrupulousness of the Auditor-General. Because he could not be satisfied that there was any stage in the process of steel making at which the material could be strictly called pig iron, he declined to approve payment of bounty money for the constituent pig iron. His objection may be merely pedantic, and perhaps hardly deserves to be described as technical, but the Auditor-General would not authorize the payment of the money until the point was cleared up. His stand forced the company to bring their claim before the Exchequer Court, the Government in the meantime granting the petition of right for the action to be taken against it.

Federal Aid to Steel Shipbuilding.

At the annual meeting of the Maritime Board of Trade, which is made up of delegates from the local Boards of Trade of the towns and cities in the Maritime Provinces, the following resolution was passed:

Resolved, That the Federal Government of Canada be asked to grant a tonnage bounty large enough to enable Canadian builders to compete in this industry and have it extended over a term of years sufficiently long to secure the permanent establishment of this industry, which is vitally important to the business interests of the country.

New Ontario Iron Ore.

On the Rainy River section of the Canadian Northern Railway and on the Port Arthur, Duluth & Western Railway there is considerable exploring for iron ore properties. Agents of American companies are more active than ever in this district. They lose no time in acquiring rights over promising locations. It is remarked that Canadian enterprise is slow in this quarter for new ore bodies. Apprehension is expressed in some quarters that after they have acquired some of the best Ontario properties, Americans may leave them undeveloped until they see their ore resources across the border near the point of exhaustion.

An ore find of considerable promise is reported from the Michipicoten district. Three different assays are reported to have shown 63 to 68 per cent. of metallic iron.

In the township of Korak, about 4 miles from the Sault Ste. Marie steel plant, deposits of hog ore that may turn out to be important have been discovered. The presence of the ore was detected by the owner of the farm on which it lies. He noticed that his cattle returned from the pasture field every evening with a peculiar stain on their hoofs. This clue led to the discovery of the ore. A shaft was sunk 12 feet, and about 20 tons of ore were thrown up. Analyses showed that it contained from 52 to 55 per cent. of metallic iron, with very little phosphorus. The land on which the ore was found is a plateau at the top of a succession of hills. It is about 1 mile long by ½ mile wide, and has the appearance of a dried up lake.

In Prince township, which is also in the vicinity of Sault Ste. Marie, a deposit of ore has been found which is reported of good quality. It is about 9 miles from the Clergue Steel Works.

Minor Notes.

An agreement has been entered into between the city of Guelph, Ont., and a company proposing to manufacture iron pipe. A site of 10 acres, ten years' exemption from taxes, and a bonus of $40,000 are to be given by the city—that is, if the sanction of the ratepayers is obtained by a vote on the necessary by-law.

There is a proposition before the civic authorities in Ottawa to establish works for the manufacture of steel from cast iron.

The foundations of the Dominion Iron & Steel Company's rail mill are completed and machinery is being put in place.

Hon. Mr. Harty, president of the Canada Locomotive Company, Kingston, has contracted with the Dominion Iron & Steel Company for a large supply of pig iron.

J. Lorne McDougall, Auditor-General for Canada, visited Pittsburgh recently in connection with the dispute about the bounty on pig iron.

Several carloads of machinery have arrived for the steel works at Collingwood. Forty-five carloads came to hand last month. C. A. C. J.

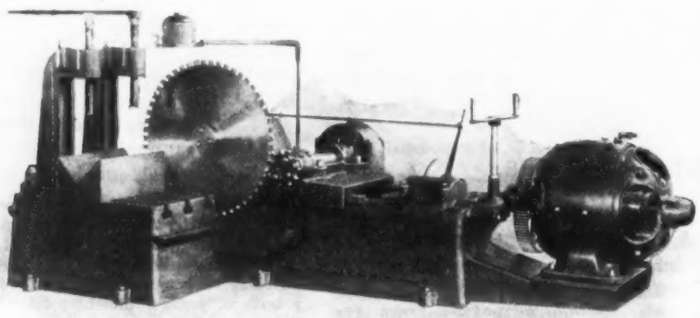
The New York and Brooklyn Subway Tunnel.

Within 60 days work is to begin on the Brooklyn extension of the New York rapid transit subway. Before that time the Rapid Transit Subway Construction Company, the corporation back of Contractor John B. McDonald, will sublet the work in sections, as was done in New York City. One of the sections which will attract the most attention, perhaps, in the public mind, is from the station in the City Hall Park to the Battery, extending under Broadway. The blasting that will be necessary between the rows of skyscrapers in the heart of the business district is to be done with the greatest care, and wherever it is deemed advisable support is to be given to walls to avoid possible accidents. The contract provides that this part of the subway must be constructed without interrupting traffic. There is a large amount of underground work beneath the Broadway surface in the shape of sewer and water pipes, gas mains and electric conduits. These must be supported. The lines of electric cars that go up and down the street must also be sustained.

Another part of the work that will be somewhat unusual is the tunnel under the East River, extending from New York City to Flatbush avenue in Brooklyn. Because of the air pressure, men can only work in relays at intervals of two hours. This makes the progress slower than it would be otherwise. The contractors have three years to construct the subway proper, and an extra year for the tunnel under the river. They hope to finish the 4 miles of subway and tunnel inside of three years.

The Bryant Metal Sawing Machines.

The Q & C Company of Chicago are introducing a line of metal cutting machines that embody many improvements over those made by them in the past. The new machines comprise two distinct types of Bryant saws. In one the saw blade is driven by a gear engaging with the teeth formed on the periphery of the blade, while the other consists of arbor driven saws in which the saw is driven by a central mandrel or arbor. Both types are made in two styles—cut off saws and universal saws. In the cut off type the blade is short and the machine is especially designed for cutting off round and square bars, structural shapes, &c. In the universal type the travel of the blade is greater and the machine is fitted with an upper side table on which the work can be cut off for the entire length of the travel of the saw. They are also arranged with V blocks and lower tables for cutting bars and shapes.



Motor Driven.

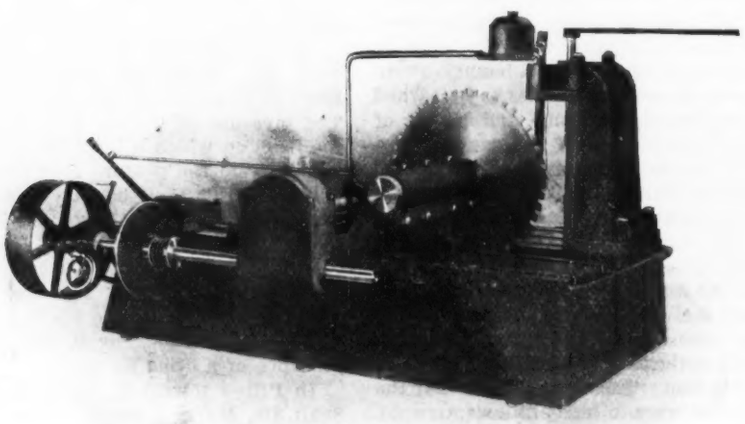


Fig. 2.—Belt Driven.

THE BRYANT METAL SAWING MACHINES.

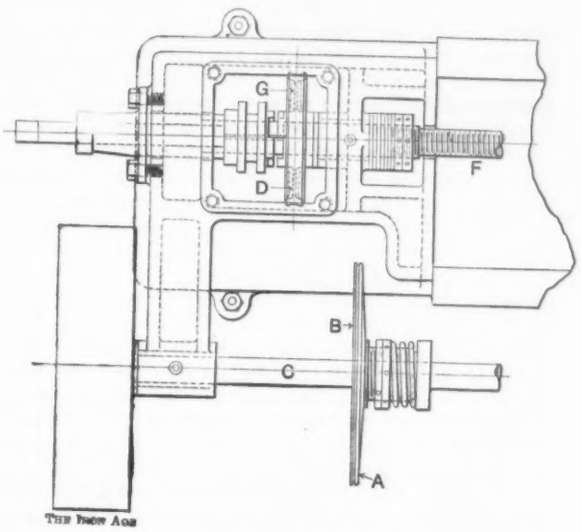
The engravings, Figs. 1 and 2, show two views of the machine, one belt driven and the other motor driven.

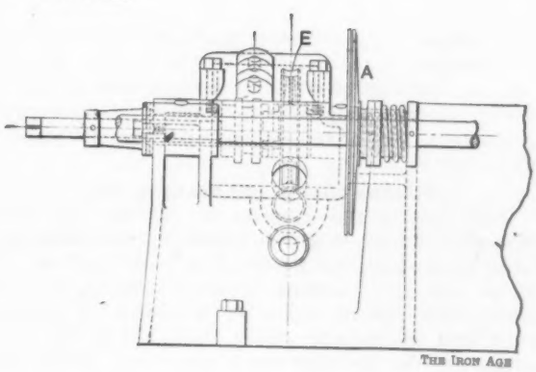
The friction type feed mechanism, which is used in place of the former gear feed, is illustrated in the drawings, Fig. 3. This consists of a set of friction disks, A B, the former of which is feathered to the main shaft and forced against the latter by a helical spring. The disk B is feathered to the shaft C, which is keyed to the worm D, operating the worm wheel E. This worm wheel revolves loose upon the feed screw F, unless engaged by the clutch G, which is feathered to the feed screw. The change of rate of feeding is accomplished

by causing the disk B to slide across the disk A by means of the yoke H and hand wheel I. The feed is variable from ¼ inch to 1 inch per minute on the Bryant saw and from 3-16 to 13-16 inch per minute on the arbor driven saws. In the universal saws the clutch also operates the power return. An automatic stop is provided for both directions of travel. When the clutch is disengaged the carriage can be moved in either direction by hand.

When desired the machine can be mounted on a circular base, which can be completely turned by rack and pinion, this being a desirable feature where there is not sufficient room for swinging a long beam. Lateral adjustment of the side tables can also be provided, so that the work can be adjusted for cutting after having been secured.

The lower side tables are of sufficient length to enable beams, &c., to be properly supported when being cut off at any angle up to 45 degrees and to permit of steel castings within the capacity of the machine being secured.





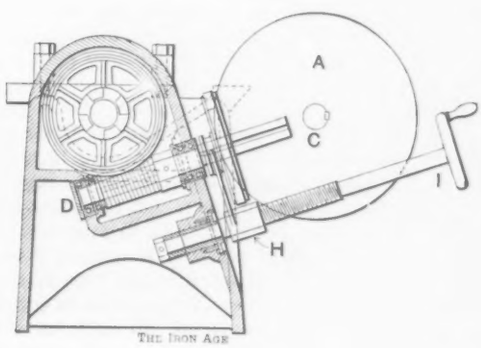


Fig. 3.—Details of Friction Feed.

THE BRYANT METAL SAWING MACHINES.

The Bryant saw carriage is in two parts, the sprocket shaft bearing being cast in one piece with the worm gear hood, and being movable 2½ inches toward the axis of the blade, allows for a wear of 5 inches in its diameter. The sprocket is removable and all sprockets on these saws are interchangeable and readily replaced. The arbor driven saw carriage is strong and rigid. All bearings are divided at right angles to the direction of the wear and are of large proportions. Both arbor gear and pinion are solid with the shaft, the pinion being hardened. The width of the face is large, and the liberal proportions employed have produced a very rigid and quiet running machine. All gears are entirely inclosed, thereby excluding dust.

A press dispatch from Annapolis, dated September 11, stated that on that day the torpedo boat destroyers "Worden," built by the Maryland Steel Company, and "Bainbridge," built by the Neafie & Levy Shipbuilding Company, successfully completed their standardization speed trial tests over the Barren Island course. The "Worden" made the high speed of 29.86 knots, while the "Bainbridge" averaged 28.72. During the first leg of the run the "Worden" developed 30.50 knots, which is the greatest speed made by any torpedo boat destroyer now afloat.

The National Machine Tool Builders' Association.—The National Machine Tool Builders' Association, of which Joseph Flather of Nashua, N. H., is president and P. E. Montanus of Springfield, Ohio, is secretary, will hold its first annual meeting in Cleveland, Ohio, October 14 and 15. Arrangements for headquarters are now being made and it is expected that the Hollenden Hotel will be the place of meeting. This organization now includes a large majority of the manufacturers of machine tools in the United States, and as the Cleveland gathering is to be the first annual meeting of the association President Flather urges attendance of all members. No regular programme of proceedings has yet been prepared, but papers will be read and subjects of interest to the trade will be discussed.

The President proclaimed on September 12 an additional act modifying the Industrial Property Convention of March 20, 1883, in accordance with an agreement reached at Brussels on December 4, 1900. This convention relates to the protection of patents and other industrial property, and it is now proclaimed by mutual agreement among the signatories excepting Brazil, the Dominican Republic, Spain and Servia.

The stockholders of the Cuban Steel Ore Company have voted to wind up the company. The company commenced business in 1899 and had a capaital of $1,000,000 of preferred stock, par 10, which has sold for cash with a bonus of common stock, and $726,000 of bonds taken by the stockholders at 85. The Pennsylvania Steel Company held a large interest. The total product of the mines now exhausted was about 40,000 tons.

A net increase of 9 per cent. occurred in the receipts at the 50 largest post offices in the United States last month as compared with August, 1901. The total receipts at these 50 offices aggregated $4,321,444, a net increase of $357,810. The largest increases were 26.6 per cent. at Des Moines, Iowa, and 26.2 per cent. at Toledo, Ohio. New York's receipts increased almost 12 per cent. and Chicago's 6 per cent.

A decree of the Russian Minister of Marine has been gazetted which requires the exclusive use of materials of Russian origin in the construction of all Russian ships, with the exception of vessels built abroad. The decree, it is said, may be modified in the case of ships which are to ply in foreign waters.

Progress in Steel Works Practice in Germany.*

BY R. M. DAELEN, DÜSSELDORF.

As is well known, by far the largest proportion of the mild steel produced in Germany is made in the basic Bessemer converter, and these conditions are likely to obtain for a long time to come on account of the nature and quality of the ores available. The somewhat stringent requirements of the consumers as regards the quality of the finished product are also best met by this method of production. A difficulty is now, however, beginning to be felt in some districts in obtaining pig iron with the necessary percentage of phosphorus, which should amount to about 2 per cent., and in consequence the numerous efforts to discover a process in which a lower percentage would suffice appear to be fully justified. Several works have already found themselves compelled to return a portion of the converter slag to the blast furnace in order to obtain the required quantity of basic pig, and the phosphorus is thus kept in circulation. Since with the above proportion, which cannot often be exceeded, no considerable evolution of heat occurs in the converter, the remelting of scrap is possible in a very much less degree than is the case in acid working. Consequently a great number of open hearth furnaces is necessary for dealing with the waste and scrap. These are generally of the basic system, lined with crushed dolomite, and their capacity is about 15 to 20 tons. A capacity of 30 tons is rarely exceeded and there are in existence only very few furnaces of 50 tons.

Basic Open Hearth Practice.

In the West of Germany the usual practice is to melt a charge consisting of 25 per cent. pig iron and 75 per cent. small scrap, six heats per 24 hours being obtained from a 15-ton furnace, while from a 25-ton furnace not much more than four are possible in the same time. From this it would appear that since the output remains about the same no particular advantage is gained by the adoption of larger furnaces, unless it is a question of producing very large and heavy ingots or castings. The initial outlay in constructing a large number of small furnaces is not so great as that required for the construction of a smaller number of large furnaces, and the consumption of fuel, amounting in the former case to 270 kg. per ton of steel, is not in any way reduced by using larger furnaces. On the other hand, the number of charges per day falls to two and one-half when the proportion of pig iron is increased to 80 per cent., a practice often followed in the East of Germany, and in that region, therefore, furnaces of larger capacity can be more suitably employed. In such instances the tilting furnace would be practicable, of which there is at present no example at work in Germany. It can, however, scarcely be anticipated that in those works where the open hearth furnaces are principally used for the melting of scrap a sweeping change in the existing system of furnaces is contemplated, and since the majority follow this practice, and since the scrap, too, is cheaper than pig iron, it is clear that the various attempts to expedite the treatment of liquid pig iron in the open hearth and thus to increase the production are not likely to find favor in Germany. There are, besides, further reasons for adhering to this system which should be taken into account in considering the adoption of any improvements which aim at increasing the capacity of the steel works without effecting a considerable saving in the cost of production.

The Situation of the German Steel Industry.

These consist in the recent remarkable extensions of existing steel works in general and the construction of many new steel works on a large scale, such as have been built in the last few years in West Germany and Luxemburg, coincindent with which there occurred a temporary decline in the demand for iron and steel products in large quantities. The causes operating to produce this decline are chiefly due to the fact that the network of railways in Germany is now for the most part complete, and that the general activity in the building trades slackened on completion of alterations and new works in many towns. The construction of secondary railways is also no longer being proceeded with, owing to the large amount of capital recently invested in these, which is not likely to return much interest for several years. And for the present no new enterprise on a large scale is in contemplation. There is, however, no cause to apprehend a general and lasting depression in the iron making industry, for it is a matter of common knowledge that periods of development at the furious rate latterly experienced, both in the production and consumption of iron, are invariably succeeded by such an interval of quietness, and naturally the revival of business proceeds at a slower pace than that at which the preceding decline took place. That such a revival has now set in is evident from the increased activity of the iron works and the improvement in the selling prices, which latter may at the present time be regarded as generally remunerative, although in consequence of the attitude of the syndicates the raw material is relatively more expensive than the half or completely finished products of the rolling mills. In other respects the determined endeavor of the German technical industry to discover new markets for iron products is manifested by the buildings of colossal proportions at the Düsseldorf Exhibition and their contents. A comparison of them with the buildings at the exhibition of 1880, or even with those of the Paris exhibitions of 1889 and 1900, shows that structures of iron, pure and simple, have to some extent given way to a combination of iron work with stone and concrete. This is, however, by no means to be regarded as a retrograde step in the application of iron to such purposes, but is indicative of the endeavor to solve the important problem of finding adequate means of protecting the iron work of buildings from becoming heated by an outbreak of fire within. Iron alone does not confer safety against the effects of fire. The necessary steps toward the achievement of this have already been initiated, and the 30 years of successful endeavor in extending the use of iron on the part of German technical science are a sufficient guarantee that a satisfactory solution of the question will be found. The compiling of the book of standard sections and the publication of standard designs for iron structural work furnish an eloquent proof of the ability to deal successfully with the matter.

Casting Ingots and Soaking Pits.

Returning to the methods in use for the further treatment of steel, it will be found that the older established works have for the most part retained the well-known system of casting ingots, consisting of a hot metal ladle carried either on a sluing or traveling crane, and successively placed above the stationary ingot molds. On the other hand, only a few of the more modern works have adopted the reverse method of drawing the ingot molds along beneath a stationary ladle, combined with which process is also the forcing out of the ingots from their molds by mechanical means. The latter method does not permit of filling several molds at once by bottom pouring, and its adoption has extended according to the ability to roll rough ingots at one heat into finished products, such as wire, rods, small sections and plates, which formerly had to be reheated after one rolling. By this means in many works the blooming rolls are dispensed with; an arrangement, however, which is only profitable where the daily production is a perfectly regular one, such as is usual in the very large basic Bessemer steel works.

It is the special aim in these works to roll down the ingot at the original heat—that is, by the use of the Gjers nonfired soaking pits. The Gutehoffnungshütte first developed this system, and at these works the ingots, after passing through the blooming mill, are rolled without any reheating into sections, rails and sleepers in a three-high mill. The results were so successful that other works have now followed the same plan. The steel manufactured by the basic process can be removed from the molds and plunged into the plain soaking pits sooner than that blown in acid lined converters, a fact which tells in favor of the system. It is also necessary to provide a means of transferring the ingot from the

* From a paper read before the Iron and Steel Institute.

blooming rolls to the finishing rolls as rapidly as possible. When this cannot be done, as in the case of such works which have no blooming mill, soaking pits, fired on the Siemens regenerative system, are employed, though the disadvantage then arises that the entire charge is heated at one time, and that the subsequent introduction of cold ingots has the undesirable effect of cooling those still remaining in the pits. To obviate this difficulty many works employ in connection with the soaking pits the rolling furnace of Helmholtz of Ruhrort, with a very long hearth and fired from one end, in which the ingots are carried forward to meet the flames. But this apparatus necessitates too much hand labor, besides causing considerable waste of metal; and on this account, since the prevailing requirement is a uniform method which insures the heating of cold ingots and the preservation of heat in the hot ingots, the American continuous reheating furnace with pushing gear has latterly been introduced in several places, the results of which are more satisfactory.

The Manufacture of Seamless Tubes.

The manufacture from mild steel of tubes and hollow bodies of every variety and size, both welded and seamless, has experienced a specially noteworthy development. The welding of hollow bodies is performed partly by heating in coke fires and partly by the use of the water-gas flame. This latter medium is particularly suitable for welding, though in other respects water-gas has not yet found extensive application in iron works, since the Siemens producer-gas, containing 40 per cent. or more of available fuel, still meets all requirements.

In the manufacture of seamless tubes and hollow bodies, two methods are principally employed:

1. That of Mannesmann, which consists in producing a hollow in the interior of a cylinder by expanding the surface.

2. That of piercing a solid billet with a mandrel.

In both cases the tube is finished by rolling out or drawing over a mandrel. The latter process has been greatly developed by H. Ehrhardt of Düsseldorf, who manufactures seamless boiler rings, besides tubes and projectiles.

Rolling Mill Engines.

To keep pace with the production of the steel works the daily capacity of the machines and appliances for working up the material, and of the rolling mills especial, has been increased. Wherever possible every appliance which is the outcome of the ceaseless progress of modern invention has been brought into play to lower the cost of production. To enter fully into the whole of such details would occupy too much time, and the author therefore limits himself to the following points: The introduction of the blooming mill for small and large ingots, and the development of the two high and three high trains as finishing mills, with continued improvement in the methods of counterbalancing, and the use of valve gears of precision for controlling the rolling mill engines when working at the highest speed of piston and maximum revolutions per minute. After many trials with valves and slides the form of valve which has found most favor is the cylindrical with a motion in the direction of the axis, the Corliss valve also, in some cases, having been adopted. Very considerable economies have also been effected by the use of efficient condensers, particularly of central installations of these, and recently by the employment of superheated steam. Quite recently it has been attempted, experimentally, to drive rolling mills direct by means of gas engines, thus opening up a possible further application for these as prime movers in the event of success. Their use would, however, be conditional upon the use of a fly wheel in connection with the system of driving the mills; for if no fly wheel is required the two crank or three crank engine is without doubt a preferable arrangement, provided that the consumption of steam and other working expenses are not greater than those of engines with fly wheels. With the newer types of the latter this question appears, however, to be decided, as may be learned from the following particulars, which have been furnished by various manufacturers. It should, however, be borne in mind that the consumption of fuel is not the only criterion in the selection of a suitable motor for a rolling mill, but the capacity of the latter to fulfill the working conditions is a consideration of the greatest importance. Although devices have been introduced by which the reversing of the rolls can be effected without experiencing a tremendous shock, and though the risk of a breakdown is still further reduced by the use of cast steel spur gearing, yet the variation of speed in rolling down ingots, which is only attainable in the fly wheelless engine, is too serious a consideration to allow the general adoption of non-reversing engines with fly wheels.

Two-High and Three-High Mills.

The deciding of the issue between the reversing and non-reversing engine will exercise an important influence on the question of the adoption of the two-high or three-high rolling mill in modern works, and the chief arguments for or against either arrangement may therefore be briefly outlined. For rolls of 600 mm. (2 feet) diameter the three-high system driven by a fly wheel engine is likely to find favor; a four-high mill with rolls up to 400 mm. (16 inches) diameter may be found preferable where a very perfect rolling of special sections is essential, because the balancing and the exact adjustment of the roll bearings is easier as compared with the three-high mill. The three-high system is, however, still used with diameters up to 900 mm. (3 feet) where the reversing two-high would, in many cases, be more advantageous if the question of cost were also in favor of the latter. The Lauth three-high mill, for instance, could serve for the first rolling of thin plates by driving the whole train with a fly wheel engine; on the other hand, for thick plates the method of driving without a fly wheel would certainly be best suited. The same rule would hold good so long as the rolls exceed 600 mm. (2 feet) in diameter, and so long as the two-high system does not involve a considerable increase in the number of stands. The extra cost of these would, however, be compensated for in great part by dispensing with the lifting tables, and by the consequent simplifying of the live roller driving gear and of the upsetting gear. Less hand labor would also be required.

With regard to the number of rolls to be provided for a rod and bar iron mill, it may be mentioned that as the result of improvements in the balancing, a considerable reduction in the length and number of rolls has already been effected, and there is a prospect of a further advance in this direction. In practice the two-high mill gives a greater daily output, and suffers less from abrasion than a three-high mill, owing to the greater speed of the rolls in the latter, and because the middle roll has twice the work of the other two, being used at every pass. The changing of the rolls is also easier with a two-high than with a three-high mill. In this connection it is advisable, when rolling sections, to have two finishing trains to one blooming mill in order to avoid stoppages, and it is then a great advantage to be able to lift the entire stands with their rolls on a traveling crane, as it is now done at the new works of the Rheinische Stahlwerke, at Ruhrort. Further, important improvements have also been effected by making the complete stands with bearing blocks and rolls of cast steel. The latter are also often made of forged steel.

The arrangement of the pinions as compared with that of older plants has been improved by placing the stand on the long bed plate with machined V-shaped guides, and attaching this latter securely to the engine bed plate. The stand is also closed underneath to form a trough, so that the lower pinion always runs in oil and carries this up with it. Further, the pinions are made hollow to receive the wabbler end, by which means the number of sockets, and consequently the length of the trains, are reduced.

Electric Motors in Rolling Mills.

The use of electric motors for driving rolling mills is at present very limited and will probably only be adopted in cases where the electricity is generated more cheaply than is possible by steam power. It is, however, now very largely used for driving the auxiliary machinery about the mills, and it is generally regarded as certain that in modern works it will entirely super-

sede the low pressure hydraulic machinery which formerly was in common use. Still, it must be admitted that the same precision of movement in cranes and hoisting gear is certainly not attainable by electric means, and for this reason many practical engineers of iron works still have a preference for low pressure hydraulic power, especially as the machinery which gives it effect is constantly being improved.

For the production and application of high pressure water power the intensifier actuated by steam pressure has proved a lasting success.

In general it may be observed that the German steel works and rolling mills are compelled to bestow strict attention on their plant and their practice in order to meet the requirements of their market—these are of so diverse a nature, and orders for one quality or form of product are by no means of the same magnitude here as is often the case in the same industry in other countries. In arranging the buildings and machinery the chief aim to keep in view is accordingly not only a large daily output and the saving of labor, but it consists rather in devising how to do work at remunerative rates even with apparatus and machines of medium productive capacity, and with frequent changes in the kind of material supplied. If on this account the German works are less imposing as compared with modern installations abroad, we can console ourselves with the reflection that circumsctances must be adapted to meet conditions and that limits can be set to all competition, however much this may be feared.

Lake Ore Matters.

The Heavy Shipments of Ore.

DULUTH, MINN., September 13, 1902.—My estimate two weeks ago of ore shipments for August was "about 4,000,000 tons." The exact figures, now obtainable, were 4,078,311 tons. This is 500,000 tons more than the corresponding month last year and is nearly 5000 tons above the best previous record, that of July, 1902. The total shipped to date is 4,800,000 tons above last year to the same time. It is evident enough now that if mining companies and consumers desire they can move 25,000,000 tons this year to November 15.

Most of the big mines have reached such a point with shipments that the remainder of the season will be less active. Probably the larger mines of the United States Steel Corporation have so far sent down about an average of 75 per cent. of their estimated output for the year. Some have done even better than that large proportion. This is an indication of the tremendous capacity of the fleet and of the careful and splendid management that has characterized the handling of ore from mine to lower lake dock by the Steel Corporation this year. Among the large mines Fayal and Adams have made the largest shipment of ore to date, amounting to about 1,200,000 tons in each case. Mahoning, Mountain Iron, Stevenson, Norrie, Chapin and Lake Superior (Ishpeming) have been largest shippers, in the order given, and running from 800,000 to 600,000 tons each. The Hibbing group of the Minnesota Iron Company, former Rockefeller mines, have shipped together about 1,500,000 tons. They have cleaned out their large stock piles, some of five years of age, and are now shipping almost entirely from underground.

The Mesaba Range.

The Wills Mining Company have been organized and will be incorporated soon with a capital of $150,000. Their stockholders include A. W. Thompson, president of the Republic Iron & Steel Company; A. Maitland, their mines manager, and E. D. Parmalee, their Mesaba superintendent. The Wills Company are commencing the opening of a mine adjoining the town site of McKinley, where it is hoped that 2,000,000 or 3,000,000 tons of ore running from 58 to 59 per cent. may be found. The ore extends under the village, and it will be moved ¼ mile, to the northeast quarter of the northeast quarter of section 18 58-16, where no ore exists. In this immediate neighborhood there is quite a body of ore, and more is being found. Elba and Corsica are close by to the west. The Corsica 80, on which explorations are under way, by Pickands, Mather & Co., corners on the southwest of the Wills mine. The McKinley is northeast. The Sheridan deposit to the east is to be opened and other finds have been touched in a preliminary way. The ore lenses are not large nor are most of them high grade, but their structure is excellent.

Work continues on the far western Mesaba. An immense amount of mineral is being found that in time may be called ore and demanded by the trade. I have seen numerous maps and prints of these explorations. Most of them show some fair ore—that is, ore running up to 57 and 58 per cent.—but this seems to be concentrated in great bodies of other ore assaying from 25 and 30 up to 45 and 50 per cent., and usually high in phosphorus. Of course, not all these finds are of this class. Some are good enough and contain sufficient tonnage of excellent ore to make them favorable. Some that seemed on first opening to be splendid are not panning out as hoped. I have in mind one remarkable instance of this nature.

The St. Clair mine, now being opened by the United States Steel Corporation, as heretofore noted, is owned by the Oliver-Snyder interest and is to be operated by the Steel Corporation under a contract, as is the case with the Shenango, a mile or so to the west. The latter, by the way, though it was expected to ship nearly 100,000 tons this year, will not be able to start shipment before 1903, on account of serious difficulty in handling water and quicksand.

Negotiations for the lease of the noted "Section 30," Vermillion range, are still actively in progress and may be closed shortly to one of the large interests heretofore mentioned as figuring on the property. Drilling is under way on the north part of section 25, east of Ely, and negotiations are said to be in progress for the optioning of a tract of land lying directly east of the Silverman property of the Steel Corporation.

A. P. Silliman, mining engineer, of Hibbing, has issued a new and revised map of the Mesaba range, covering the whole range through to the Mississippi River. It shows the various mines, new as well as old, and gives roads and trails.

The Menominee Range.

Ore is coming up again from the Great Western, after an idleness of more than a year. Men are working underground, and a larger force will be put in as fast as may be possible. No. 1 shaft is deeper than No. 2, and the water is scarcely out of it. Some ore has been found in a new spot near the Lincoln shaft at Crystal Falls. The Rewabic Iron Company have three exploring crews out near Iron River, and will add others, both there and on the Gogebic range. The Castle Mining Company have been incorporated by Oglebay, Norton & Co. to operate on sections 6 and 7, near Norway, and are already at work there. Developments at the Mansfield, which is gradually becoming a large and very fine mine, are such as to indicate that had the original work in what was called the Caledonia shaft been deep enough the operators would have been amply repaid for their outlay. The trend of ore in the deep levels of the Mansfield indicates that it passes under 300-foot shaft of the Caledonia, at, say, 1300 to 1500 feet. It appears that deposits of ore in the Michigamme Valley, whatever they may be, are at considerably greater depth than has been supposed, and that explorations to be measurably sure of success must be carried far deeper. This, as a matter of fact, is the experience almost everywhere on Lake Superior, generally speaking, and those that are able to profit by it are reaping a reward.

Pickands, Mather & Co., whose very extensive Mesaba range operations were noted last week, are also mining largely on the Menominee and Gogebic ranges. On the Menominee they have the Verona and Hemlock River Mining companies. The former includes the Baltic and Caspian at Stambaugh, the Vivian at Quinnesec and the Verona at Vulcan. On the Gogebic range the Verona Mining Company operate the Mikado near Bessemer, and the Odanah Iron Company operate the Cary and Windsor near Hurley. These mines are being developed extensively and some of them are showing up remrakably well. These make 16 mines under their control, without the Elizabeth, at Hibbing, all of which are

either now mining or are being prepared for active operations as fast as possible.

The Chicago, Milwaukee & St. Paul road will move about 1,000,000 tons of ore over their new Escanaba docks, which is less than their expectations, largely perhaps because there are not facilities for moving more. To overcome this the road will extend their dock facilities again, and will probably build another dock the coming winter.

In a note as to the cargo of the steamship "J. H. Hoyt," unloaded at the South Chicago docks, this correspondence said last week that the cargo was taken out at the rate of "1000 tons per hour." The figures should have been 1400 tons per hour. D. E. W.

Niagara Power Development.

There is notable activity in the development of power in the vicinity of Niagara Falls. Up to 1877 the great amount of power available at that point was unused, but after the Schoellkopfs purchased the old hydraulic canal, which had been building over 25 years, the then village of Niagara Falls took a leap toward industrial greatness. Ever since the Schoellkopf family have been interested in the Niagara power development they have been active in the development of the force at their command. The first users of the canal power bought or leased from the Niagara Falls Hydraulic Power & Mfg. Company the right to draw water from the canal, installing their own power plants. In 1881 the company built a new wheel pit and commenced supplying power to customers, delivery then being made by means of belts, shafting and wire cables, which were then the most practicable means of transmitting power. Later compressed air was tried. When the original grant of land was made for the canal construction the privilege extended only to the edge of the high bank, with the right to excavate down the bank 100 feet, it not being felt at that time that a higher head of water would be available, as it was deemed impossible to construct wheels that would stand up under a higher pressure, and the fact is that then 50 to 60 feet was the head used by the majority of mills. In the early eighties hydraulic engineering made wonderful strides, and it was quickly deemed advisable to secure rights on the *débris* slope beneath the cliff. The development has progressed until a head of 210 feet is to-day being used by this company.

All summer long the Niagara Falls Hydraulic Power & Mfg. Company have had their dredges, tug, scows and a large force of men at work widening and deepening their waterway, which has a length of 440 feet from the upper to the lower river, and the right of way for which is 100 feet wide. Out in front of the entrance to the canal dredges are at work making it possible to get a full supply of water for the service of the mills and power station that receive their supply of water from the canal. Many thousands of dollars have been expended, all going to aid in the development of power at this favored spot. Within a short time the Niagara Falls Hydraulic Power & Mfg. Company have added to their acreage at the north end of the city, and the Carter-Crume Company have received bids on the erection of their new manufacturing plant, to be built in this new industrial section of Niagara Falls. Other large factories are expected to locate in the same section of the city. The lands of the power company are close to the main railroad yards of Niagara Falls, and excellent receiving and shipping facilities will be at the command of the plants locating there.

The new station of the Niagara Falls Power Company is rapidly approaching completion, and within a few weeks the first generator in this magnificent new plant will be supplying electric power. This new station will be known as power house No. 2. It will have an output capacity of 55,000 horse-power, which, added to the 50,000 horse-power developed in power house No. 1, will make the total output of the Niagara Falls Power Company 105,000 horse-power. Thus this installation will be the largest electric power generating plant in the world.

As a building, power house No. 2 of the Niagara Falls Power Company is a more beautiful structure than the original station. The same stock is used in its construction, but architecturally it is far the superior of the station that has been so much admired by all who have looked upon it. The building is 560 feet long and 70 feet wide. On the north side a fore bay structure 40 feet wide runs nearly the entire length of the building along the inlet canal. In every part the building is fire proof, and the telephone, bell, light and general service wires are concealed in spiral metal tubing. The window casings are of steel, the partitions are of hollow brick and metal lath are used. The roof is of slate.

The National Contracting Company, of which Walter McCulloh is resident engineer at Niagara, had the contract for the construction of the big new wheel pit, and have completed their task. The construction plant established by this company cost about $130,000, and now the larger portion of it has been disposed of. The new wheel pit is 463 feet 8 inches long, 18½ feet wide and 178½ feet deep, and from its depths comes the sound of hammers as the turbine and penstock installation is being placed. The turbines were made by the I. P. Morris Company of Philadelphia. The General Electric Company, makers of the generator installation of the new station, are now at work erecting generator No. 11, which will be of similar design to those in the old station, with the exception that the bridge over the top will be omitted. The single switchboard structure that is to have place in the station for the control of the 11 generators is being erected.

The water was some weeks ago let into the fore bay, and now washes the racks ready to be called upon to plunge down the huge penstocks to actuate the turbines. The inlets to the fore bay from the canal are 24 arches, the tops of which are below the normal level of the water in the canal. By this means it is expected to avoid any possible trouble from floating ice in the canal. At power house No. 1 the racks are not covered, and the current of the canal washes along them; but in the new station the water will flow through the arched inlets and then against the racks, which are set about 10 feet back from the arched openings. The big cofferdam that was placed in the canal to aid in the wheel pit work has been removed by a dredge, and out in front of the entrance to the canal a dredge and scows are at work deepening the river channel in order that a free flow of water may be available at all times. Last winter the river ice gave considerable trouble to all Niagara power plants, but it is expected that the new work will prevent any future trouble in this direction.

The By-Products Paper Company have recently started their new plant on the lands of the Niagara Falls Power Company. Charles B. Gaskill, who was one of the chief promoters of the great tunnel project and for years president of the Niagara Falls Power Company, is manager of the new plant. The company occupy the building originally erected for the French-Hickman Flax Fiber Company, which company never started their process at Niagara. The plant is a large one and stands south of the plant of the Electrical Lead Reduction Company's building. This latter company are adding to their facilities in order that their product may be doubled. The new building of the Composite Board Company is up and stands to the rear of the plant of the By-Products Paper Company, between the river and the Carborundum Company's plant. This new factory building is 400 feet long and 75 feet wide, of brick. It is expected that the plant will be operated this fall. The company moved to Niagara Falls from Fulton, N. Y. The Atmospheric Products Company are erecting a new brick building between Buffalo avenue and the upper works of the Pittsburgh Reduction Company. It will be used as the company's machine shop, in which the apparatus for the fixation of nitrogen, to be used in another building yet to be erected, will be manufactured. The United Barium Company have recently completed a new brick building adjoining their plant in the rear of the Castner Electrolytic Company's factory.

At every point, in every direction about Niagara, the benefits of the great development of power are apparent. Building is active and new homes are going up in all parts of the city. Several concerns are looking for factory sites. Numbered among the firms seeking a desir-

able manufacturing location in Western New York are the American Carbolite Company, of which Senator Towne is president. Wherever the American Carbolite Company locate the Standard Carbolite Lighting Company, an allied industry, will also locate.

The Carborundum Company have awarded contracts for the erection of two new buildings, one of which will be used as a machine shop, the other for a crushing and grinding plant. The machine shop will be of brick, two stories high, 55 x 97 feet, and will cost about $5000. The building in which the crushing plant will be located will also be of brick, 50 x 115 feet, and will cost $9000.

Notes from Great Britain.

The Commercial Outlook in South Africa.

LONDON, September 6, 1902.—We are now in a position to gauge rather more accurately the commercial outlook in South Africa. It is difficult to believe that as these notes are being written the Boer generals are in Mr. Chamberlain's private room discussing South African politics and making various arrangements for the future administration of the Transvaal and the Orange River colony. Yet so it is. Meantime, the business man is asking where he comes in. It is certainly a fact that up to now he has not got very much, and he is accordingly dissatisfied. As you cannot make omelettes without breaking eggs, so in like manner you cannot wage war with a civilized community without smashing into atoms not merely the network of governmental organization, but also the commercial machine as well. And so, although peace is declared and the Cape Parliament is sitting and the Boers are returning to their farms, yet the net result is that business is carried on under adverse conditions. The military still rule the roost. They run the railways,and martial law is still partially in operation. This means that out of many evil things at least there is one good thing—namely, a more expeditious repairing of the railways and railway bridges than would be the case under private management. As the railways are the key to the situation, it is as well for this point to be made quite clear. The first great necessity is not merely the repair of the railway system, but also the co-ordination of the railway services of South Africa.

But when all allowance has been made for the extension of the railways, it still remains true that they are hopelessly inadequate to cope with the burden of traffic at present being thrown upon them. In addition to the Cape Colony railways there are also the lines from Delagoa Bay and Durban into the Transvaal. As Johannesburg is now the commercial metropolis, it follows that these railways are being taxed to the utmost. As these three railways are dominated by diverse interests there is no co-ordination between them, and traders accordingly suffer severely because they can obtain no accurate information as to the quickest routes to get their goods delivered into the mining districts of the Transvaal. And notwithstanding the heavy orders that have been given out for railway material there is still a serious shortage, particularly of trucks. Sir Percy Girouard has doubled the old Netherlands truckage and greatly increased the number of engines, and orders are still being given out. A comprehensive survey of the transit problem of South Africa shows conclusively that trade is severely handicapped in this direction and is likely to be so for many months to come.

In reply to inquiries as to whether the Cape railway system had suffered any inconvenience from the slow delivery of rolling stock by British manufacturers, regarding which there have been complaints from the Cape Town Chamber of Commerce and in other business quarters, the writer was told that the management had been seriously inconvenienced by these delays. They had impeded the work of the Department and had been detrimental to the progress of the colony. "That," said his informant, "was the main reason why we were compelled to look elsewhere, coupled as it was with the very high prices which Cape Colony has been compelled to pay for rolling stock. These conditions compelled us to cast about elsewhere for a portion of our rolling stock and to see whether we could not obtain it more expeditiously and on more reasonable terms." "Elsewhere" in this instance means the United States, for as yet very little rolling stock of German manufacture has gone into the equipment of the Cape railways.

The Cape Railway Department has not given orders to the United States for steel rails. This sounds highly patriotic, but of course if they gave the orders they could not be filled, bearing in mind the present condition of the American market. The American engines which have been purchased are giving satisfaction, although complaint is made that they are not so well finished as are the English engines. How long it will be before American rails find their way into South Africa depends upon changes in the American market. There is no doubt that some of the contractors to the Cape system have imported rails from the United States, but not in any quantity. A representaive of the United States Steel Corporation is now in South Africa watching the situation, and later on we shall perhaps know more definitely to what extent America will supply South Africa with permanent way. A number of orders have gone to Hungary and Belgium for railway cars. Asked for an explanation why these orders had gone to other countries, the answer was that every attempt had been made to get all the 2-foot gauge stock in England, but the price for it was approximately double what was asked by the Hungarian makers.

But South Africa cannot live on its railways, nor can the railways exist only upon the mining interests of the Transvaal. It is necessary to inquire a little more closely into the actual economic position of the country before arriving at any conclusion as to the future. Apart then from gold and diamonds it may be said that, generally speaking, South Africa is a poor country. The Orange River Colony contains undoubtedly fine wheat growing areas, and this fertility is shared in part by Cape Colony and Natal. On the other hand there are great deserts like the Karro and the Kalahari, which are of no value whatsoever. To the natural conditions of the country must be added the total uprooting of farmsteads by the military depredations. They have to be rebuilt and pastoral life resume its silent ways, and this must take a long time, particularly as money is exceedingly scarce. The £3,000,000 given to the Boers by the British Government is a mere drop in the ocean. It has been computed that the value of the farmsteads destroyed on a moderate estimate was not less than $250,000,000. It is true that money can be borrowed for the first two years without interest, but the cautious nature of the Dutch farmer is such that capital of this sort will be sparingly utilized.

Another important factor in the South African problem is that of labor. The mine owners have failed to set all their machinery going for want of native labor, but the other industries essential to a community, such, for example, as the building trades, are handicapped by the same shortage of labor. This has a depressing influence upon the demand for commodities, first because it limits mining activities and therefore decreases the main stream of wealth, and, second, where labor is short the consumption of commodities is necessarily restricted. Of course, as always happens, the labor question tends to settle itself by slow degrees. There are from 12,000 to 15,000 people still at the coast ports waiting for permits to go up into the Transvaal. There are many thousands more who have applied for permits to go to South Africa. There is undoubtedly room both for skilled labor and for the agriculturists. But unskilled men who go to South Africa assume serious risk, as the cost of living is higher than in any other part of the world.

Just at present freight rates from New York to Cape Town are 10 shillings a ton less than from England, and the result of this has been some stimulation of American orders. As things are now, however, and until more commercial missionary work is done by Americans, it may be said generally that South Africans will only buy certain special goods from America in which the Americans are undoubtedly superior and for the rest will buy from England. As a result of the special

freight rates recently offered one South African firm, for example, who had ordered 500 American stoves doubled the order. What is wanted, however, is greater variety of metal goods crossing from America to South Africa.

This slight sketch of the commercial position in the recently war swept zone but dimly indicates the tremendous difficulties that confront both political and commercial statesmen in that region. It is difficult, to begin with, to appreciate the extent of territory covered. There is not only the Cape Colony and Natal, there are also the Transvaal and the Orange River Colony, there are the British protectorates and there is Rhodesia, which runs well up into Central Africa. All this territory is practically a virgin market. Railways no doubt are being thrown out right and left, and the mineral resources are being tapped with considerable activity. But so far as the structure of civilized society is concerned, South Africa lies prostrate and its neck is still under the heavy boot of the dragoon.

A New Steel Combine.

It may be remembered that last January announcement was made that the firm of Dorman, Long & Co. had secured half the ordinary share capital in Bell Brothers, Limited, with the object of developing the manufacture of steel from Cleveland ironstone. A new agreement has now been entered into between the two firms, whereby they become amalgamated. From one of the circulars addressed to the shareholders by A. I. Dorman, chairman of the company, the following extracts are taken:

Your directors have entered into a provisional agreement to purchase from Sir Lowthian Bell and his family 30,000 shares of £5 each, with £3 10s. paid up, being the remaining half of the ordinary shares of Bell Brothers, Limited, thus constituting Dorman, Long & Co., Limited, the owners of all the ordinary shares in that company, the consideration being the issue to Sir Lowthian Bell and his family of ordinary shares in Dorman, Long & Co., Limited, of the nominal value of £225,000. This price is approximately the par value of the shares in Bell Brothers, Limited, plus half the reserves and undivided profits appearing in the balance sheet of the company.

When in January, 1899, your company subscribed for half the ordinary share capital in Bell Brothers, Limited, it was contemplated to develop the manufacture of steel from Cleveland ironstone. As is well known, Sir Lowthian Bell had long entertained the opinion that steel of satisfactory quality could be so produced, and had conducted extensive experiments with that object. Your company had made some progress in the same direction, and it appeared that the establishment of steel works in the immediate proximity of blast furnaces was desirable, and that Bell Brothers, Limited, with their extensive blast furnace plant, ample space at Clarence, and excellent mineral properties, were exceptionally well laid out for the operation. Since then steel works have been erected at Clarence and are producing ingots of uniformly satisfactory quality.

A rolling mill of the most modern construction has also been erected and is now ready for work. To avoid the risk in the future of any conflict of interests in dealing with the finished product of the mill it is desirable, and even necessary, that there should be a more complete union of the interests of the two firms. This has been fully recognized by all parties concerned, and after due consideration has resulted in the agreement above mentioned.

Sir Lowthian Bell has consented to become chairman of your company, and three other directors of Bell Brothers, Limited, join your board. I become vice-chairman and take the position of managing director in conjunction with Mr. Panton and my son.

When I addressed you in December last I intimated that no large capital expenditure was then in contemplation. Your board have since had under consideration the reports made to them by one of the managing directors after a visit to America, and have found it expedient to remodel and enlarge your furnaces and mills, which has in part been already accomplished. The expenditure for this purpose and the working capital required for the largely increased operations of the company render it necessary to raise £250,000, which the board have decided to do by an issue of ordinary shares, to be offered to the shareholders at par, in the proportion of one-third of their holdings as registered on October 1, 1902. It has been arranged that any of this issue not taken by the shareholders of Dorman, Long & Co., Limited (not exceeding 125,000 shares) shall be allotted to Hugh Bell and myself at par, who undertake to accept such allotment.

After this operation has been carried out, the capital of your company will stand in ordinary shares as follows:

Present capital	£525,000
Proposed issue to Sir Lowthian Bell and family	225,000
Now to be offered for subscription	250,000
Total	£1,000,000

On several occasions the shareholders have raised the question of subdividing the present £5 shares of the company into shares of £1 each, this being the most usual denomination for industrial companies. The board, having given full consideration to the subject, are of opinion that the present is a favorable time to effect this change.

A Month's Shipbuilding.

Herewith is a complete statement of the new ships built for foreign countries by British shipbuilders during the month of August, giving the ship's name, port at which built, destination and flag, a statement which has been specially compiled for *The Iron Age:*

	Gross tonnage.
"Asashio," Chiswick, London, Yokosuka, Japanese	365.07
"Bagdad," Thornaby-on-Tees, Hamburg, German	1,682.87
"Bla," Goole, Gothenburg, Swedish	889
"Dalmata," Port Glasgow, Buenos Ayres, Austrian	1,772.98
"Druid," Paisley, Ottawa, British	503.26
"Duna," Newcastle-on-Tyne, Venice, Austrian	2,915.85
"Entrerios," Sunderland, Hamburg, German	4,395.05
"Azalea," Grimsby, Ymuiden, Dutch	208
"Camelia," Grimsby, Ymuiden, Dutch	208
"Dahlia," Grimsby, Ymuiden, Dutch	208
"Erica," Grimsby, Ymuiden, Dutch	208
"Export," Middlesbrough, Alexandria, Russian	2,692.84
"Grampus," Renfrew, Durban, British	1,028.73
"Haldis," Sunderland, Hamburg, Norwegian	1,700.08
"Halvard," Sunderland, Hamburg, Norwegian	1,699.57
"La Champagne," Hull, Boulougne-sur-Mer, French	230.75
"Laura," Irvine, Christiansand, Norwegian	699.02
"Luzon," Hebburn-on-Tyne, Fiume, Austrian	4,145.45
"Marie," Hull, Boulogne-sur-Mer, French	230.75
"Mazaruni," Port Glasgow, Georgetown, Demerara, British	415.18
"Morea," Stockton-on-Tees, Hamburg, German	1,727.39
"Neptune," Hull, Ostende, Belgian	199.29
"Pauline," Irvine, Calais, French	376.5
"Rosa Mystica," Porthleven, Cornwall, Boulogne, French	75
"Shirakumo," Chiswick, London, Yokosuka, Japanese	367.89
"Svealand," West Hartlepool, Gothenburg, Swedish	2,935
"Teredo," Renfrew, Durban, British	897.73

Although this shows an excellent output, it has to be remembered that most of these ships have been nearing completion for some time past. Unfortunately new orders are scarce, and there is an undoubted slackness in the shipbuilding industry at the present moment. An evidence of this is shown in the fact that a notice has been issued by the South Durham Steel & Iron Company, Limited, in which it is stated that at a meeting of the directors, held in Stockton-on-Tees on Friday, August 28, it was decided in consequence of specifications from shipbuilders and other customers not being sufficient to keep the company's three works in full operation, and having regard to the increased cost of running such works on short time, to close the Moor Works at Stockton, with a view of keeping the malleable works at Stockton and the works at West Hartlepool in full swing.

The Markets.

The metal markets are in an anomalous position, for prices are hardening but business is slackening. There has been a distinct bull movement since last Tuesday in practically every market. But why or how no man can tell. The writer saw a private letter this week from a prominent iron and steel merchant, intimating a rise in certain lines of high grade steel of £1 a ton, and intimating the possibility of a further rise in the near future. The American demand is, of course, still with us. As an evidence of this the following is quoted from an unusually well informed source:

That the Scotch iron and steel trades are controlled by the American demand for both raw and finished material is beyond question. Some of the steel makers—in point of fact, the largest firm in Scotland—have been fortunate enough to make contracts with American consumers sufficient to keep their plant in full operation during the remainder of the year and far into 1903. The bulk of the contracts booked by the firm in question is for steel billets; but latterly the Americans have taken considerable quantities of angles. Another large Scotch firm have likewise been lucky in respect of their business relationship with some of the big American consumers of steel. With regard, however, to the repeated statements that the Lanarkshire Steel Company have secured contracts for 80,000 tons of steel, I have the very best authority for saying that there is absolutely no truth in the American report.

The exports from Middlesbrough during the month of August to the United States amounted to 26,376 tons.

Current prices are as follows:

Pig Iron.—Scotch, 57 shillings 6 pence; Middlesbrough, 53 shillings 2 pence; hematite, 60 shillings 6 pence; forge

qualities, Staffordshire cinder, 50 to 51 shillings; part mine, 53 to 55 shillings; all mine, 57 shillings 6 pence to 67 shillings 6 pence; best do., 77 shillings 6 pence to 80 shillings; cold blast, 95 to 100 shillings; Northamptonshire, 52 to 53 shillings; Derbyshire, 52 shillings 6 pence to 53 shillings 6 pence; North Staffordshire, 53 shillings 6 pence to 54 shillings 6 pence; Lincolnshire, 56 shillings 1 penny.

Finished Iron.—Marked bars, £8 10s.; Earl of Dudley's brand, £9 2s. 6d.; second grade, £7 10s.; common unmarked bars, £6 12s. 6d. to £6 15s.; North Staffordshire bars, £6 15s.; angles, £7 10s. to £7 15s.; sheets, singles, £7 12s. 6d. to £7 17s. 6d.; doubles, £7 15s. to £8; trebles, £8 7s. 6d. to £8 12s. 6d.; galvanized corrugated sheets, f.o.b. Liverpool, £11 5s. to £11 10s.; hoop iron, £7 5s. to £7 10s.; nail rod and rivet iron, £7 5s. to £7 10s.; gas strip, £7.

Steel.—Bessemer billets, £4 15s. to £5; best Siemens billets, £5 to £5 5s.; mild steel bars, £6 10s. to £7; steel plates, £6 10s. to £7 10s.; steel girders, £6 to £6 5s.; steel angles, £5 15s. to £6 5s. At Middlesbrough: No. 3 Cleveland, 52 shillings 6 pence to 52 shillings 9 pence; No. 4 foundry, 51 shillings 6 pence; gray forge, 50 shillings 6 pence. In South Wales, tin plate bars, £5; Siemens coke finish tin plates, 13 shillings 9 pence. S. G. H.

Government Tests of Oil for Fuel.

WASHINGTON, D. C., September 16, 1902.—The Navy Department will shortly make public a report prepared by a special board composed of Lieutenant-Commanders J. R. Edwards, W. M. Parks and F. H. Bailey, appointed to make a series of exhaustive tests of petroleum as compared with coal for fuel purposes. The experiments have covered a wide range and it is believed will be of great value not alone to the navy, but to the merchant marine, as well as to steam users in many important manufacturing lines.

The work of the board has been divided under three general heads: 1, The supervision of an elaborate series of experiments made at a plant especially equipped for the purpose in this city; 2, the observation of tests made by steam merchant vessels, and, 3, the observation of tests of stationary boilers in manufacturing plants. To carry on this work the board has not only been able to avail itself of an allotment of the bureau's annual appropriation, but it has had the services of the best experts in the bureau, including a large staff of trained observers, and for the practical work of the tests it has been able to employ the most experienced mechanics and enlisted men in the naval service. Because of these facilities it is estimated that although the appropriation available for this purpose is but $30,000, the work done could not be duplicated by a private enterprise with an expenditure of less than $250,000.

Character of the Tests.

The plant erected in this city to test liquid fuel was installed by the Oil City Boiler Works, embracing a 1000 horse-power water tube boiler, in which has been developed nearly 2000 horse-power under forced draft. As preliminary to the oil tests coal was burned under this boiler for nearly 15 months under the supervision of the bureau's experts. The special board then began the oil tests for the purpose of determining the relative efficiency of California and Texas oils as compared with coal, the practicability of burning oil under forced draft, the relative values of air and steam for spraying oil, the relative efficiency of the leading types of burners, the desirability of gasifying the oil before combustion, &c.

The data secured from these tests is of the most elaborate character, and will be printed in full in the forthcoming report of the board. It has been gathered with the utmost care and in the most impartial manner possible. Endurance tests running through five consecutive days have been made with a view to securing the most reliable average performance as well as to determine the results likely to be obtained under practical service conditions. While the detailed results of these tests will not be made public until the board's report is finally completed, the correspondent of *The Iron Age* is able to present some of the conclusions that have been reached. In the first place the vast superiority of air over steam for spraying the oil has been determined beyond the possibility of a doubt. This feature the board regards as of the highest importance, for not only is the air more easily controlled but a saving of steam is effected that is of inestimable advantage on board ocean going vessels where fresh water is at a high premium.

The board has determined that it is quite practicable to burn liquid fuel under forced draft by the use of special appliances which have been employed in these tests, and thus one of the objections heretofore raised against the use of petroleum in the naval service has been obviated. Tests made several years ago demonstrated the fact that pound for pound there were more heat units in petroleum than in coal, but to realize this greater efficiency in the same length of time under forced draft was impracticable. It is now possible to burn oil as rapidly as is desired, and while the limit of economic consumption has by no means been reached, the results have been very satisfactory.

With regard to the important question as to the relative efficiency of oil and coal the board is convinced that while some of the claims made for oil in this connection are exaggerated, it is a conservative proposition that 1 pound of oil will do 30 per cent. more work than a pound of coal. These figures are made on the basis of Beaumont oil and Pocahontas coal, and the board is of the opinion that the inconsistent results achieved by many recent tests are due to the difference in quality either of the oil or of the coal as compared with these standards.

As to the desirability of gasifying the oil before burning it, the board does not hesitate to express the opinion that it is neither necessary nor desirable under boilers of any considerable size. Much time has been devoted to a study of the baffling of the gases, and while considerable data have been secured this important problem is probably further from solution than any other feature of the board's work.

Special Water Tube Boiler Desirable.

Summing up the results secured, it is the opinion of the board that the highest efficiency of oil can only be secured under a water tube boiler of special design. The furnace should be materially lengthened and a very large combustion chamber provided. The construction of such a boiler would necessarily produce new conditions controlling the baffling of gases, which would have to be carefully studied anew. The water tube type of boiler is regarded by the board as specially suited to the use of liquid fuel, and it is believed that with the modifications suggested the relative efficiency of oil as compared with coal may be materially increased.

In addition to the tests made at the plant referred to details of the board have been made to visit and observe five tests on merchant marine steamers and four tests at private manufacturing plants. The data thus secured have been carefully tabulated for consideration in comparison with the results of the bureau's special experiments.

So satisfactory have been the tests conducted by the special board that the bureau has authorized the installation of a complete liquid fuel system on board the torpedo boat "Talbert," and if the results meet expectations other torpedo boats will be similarly equipped. The board has developed a large number of experts in the use of liquid fuel among the machinists and enlisted men, and for two months has employed the entire crew of the torpedo boat "Rodgers" in running the stationary plant in use in this city.

Test on a Merchant Steamer.

One of the most important tests surpervised by the bureau was recently made on board the Oceanic Steamship Company's steamer "Mariposa" on a long run from San Francisco to Tahiti and return. With regard to this test, which was observed by Lieutenant Winchell, the correspondent of *The Iron Age* has been furnished the following semiofficial statement:

Lieutenant Winchell's report upon the run says that the average horse-power developed was about 2481. The distance for the

round trip was 7098 miles and the vessel required 262 hours for the voyage from San Francisco to Tahiti and 260 hours for the return trip, the average distance made each day being 354 knots, giving a mean speed of 13.58 knots an hour. The consumption of oil was about 278 barrels per day, which was an average consumption of 3720 pounds per hour. One and one-half pounds of oil per hour were required to develop a horse-power, or about 50 per cent. of the weight of coal that would have been required under similar service conditions. Lieutenant Winchell notes that under favorable conditions highly efficient boilers and engines on shore have developed a horse-power with 1½ pounds of coal, but not under conditions approaching those which prevailed on board the "Mariposa."

The efficiency of the oil fuel increased throughout the voyage, and the speed secured on the return trip was considerably higher than that on the run to Tahiti, which Lieutenant Winchell attributes to the fact that as the firemen became better accusomed to manipulating the burners they were able to increase the steam generating capacity of the fuel. The system installed on the "Mariposa" for the use of fuel made it possible to do away with a number of stokers, and the force in the engine room and fire rooms was reduced from 35 to 20 men, thus decreasing the complement of the ship from 81 to 65. While the burning of oil makes a much lighter demand upon the physical endurance of the men in charge of the furnaces than does coal, yet Lieutenant Winchell suggests that it will be found desirable to employ a more intelligent class of men possessing a mechanical aptitude and readiness of resource and nerve. He regards the trip as a whole as a tribute to the skill and efficiency of the mechanics of the Pacific Coast, and he adds that it showed great enterprise on the part of the steamship company "in boldly meeting the difficult application of oil fuel installation to their fleet of vessels on the Pacific." With regard to the condition of the vessel after her voyage, Lieutenant Winchell states that a careful inspection failed to show any bad effect of the oil flame upon any part of the boilers, and that upon reaching Tahiti after the run of 3438 miles the tubes were swept by scrapers, when it was found that all the refuse collected barely filled two ash buckets and some of this came from the coal which had been used on preliminary trial.

The chief difficulties encountered on the "Mariposa's" trial were in the regulation of a supply of oil to the heaters by the pumps, which is influenced more or less by the temperature of the oil, which should be uniform to give the best results. The choking of the strainers by foreign matter and impurities of the oil also occasioned some trouble, but the installation of duplicate strainers on the next trip will obviate this difficulty, thus permitting a clear strainer to be switched in while the choked one is cleared of its obstruction. In summing up the main points to be observed Lieutenant Winchell says that "it is essential to keep a constant air pressure for atomizing the oil, to make provision for maintaining regular temperatures of the oil fuel, and to keep a steady watch on the oil strainers."

In connection with these tests Admiral Melville, Chief of the Bureau of Steam Engineering, points to the fact that they are likely to prove of greater value to the merchant marine than to the navy, and he has already received flattering evidence of the interest that is being manifested in these experiments by the commercial world at large. The demand that Congress shall make liberal provisions for continuing these tests is very strong, for it is realized that the experts of the bureau have no prejudices to overcome and have extraordinary facilities not at the command of private enterprise. The board stands ready to loan its experts for the accurate observation of tests that may be made by private concerns, and it is in position to exchange valuable information with all desiring to co-operate with it. W. L. C.

The Engineers' Society of Western Pennsylvania will open their season with a reception and dinner at the University Club, Pittsburgh, on Tuesday evening, September 23. Later in the evening a business meeting will be held when the following papers will be read: "The Double Deck Bridge of the Pennsylvania Lines Crossing the Allegheny River at Pittsburgh," E. A. Amsden of the American Bridge Company; "The Allegheny Track Elevation," H. S. Wilgus, engineer in charge of the work; "The Function of the Rivers in Maintaining Pittsburgh's Industrial Supremacy—Rules and Regulations Concerning the Bridging of Navigable Waters—The Harbor of Pittsburgh," Capt. William L. Sibert, United States corps of engineers; "Artificial Obstructions to River Transportation," Capt. John F. Dravo of the Pittsburgh Coal Exchange.

Among the papers to be read at the forthcoming meeting of the New England Cotton Manufacturers' Association at New York on September 30 to October 2 will be one on automatic stokers and on mill construction.

The Grain Crop.

Killing frosts in Nebraska, North and South Dakota and Minnesota, heavy frosts in Kansas and Iowa, and light frosts in Ohio, Indiana, Illinois and Missouri caused consternation among speculators in corn during the week. Damage all the way from 5 to 50 per cent. was claimed in Nebraska and Iowa, but according to Secretary Wilson of the Department of Agriculture the corn crop, while late, is out of danger from frost, and this seems to be the opinion of the more conservative dealers in grain. But even should there have been some loss by frost the crop is a very large and fine one, although the month of August was responsible for a decrease in the anticipated yield. The September report of the Department places the condition of corn at 84.3, against 86.5 on August 1 and 78.8 for the ten-year average. The figures for September indicate a total crop of 2,400,000,000 bushels. It is notable that Kansas suffered a decline of 12 points and South Dakota a decline of 10 points during the month of August, but the condition in the other principal corn growing States was changed but little. But while there was such a marked decline in Kansas the condition there is given as 91, or 25 points above the ten-year average, while Nebraska and Missouri exceeded the ten-year average by 25 and 32 points respectively.

The average condition at harvest of winter and spring wheat combined is placed by the Government at 80, against 82.9 on August 1, 82.8 on September 1, a year ago, 69.9 in 1900 and 78.9 the ten-year average. The Government's figures on September 1 this year indicate a total crop of about 600,000,000 bushels, it being generally admitted by commercial authorities that the winter wheat crop will aggregate 380,000,000 bushels and the spring wheat crop in the neighborhood of 220,000,000 bushels. Pennsylvania and California report conditions 5 points, Iowa 12 points and Kansas 49.23 points below the ten-year average of the respective States, while all the other principal wheat growing States show conditions ranging from 13 to 25 points above their respective ten-year average.

The average condition of oats unharvested, according to the September report, was 87.2, against 89.4 on August 1, 72.1 on September 1 last year, 82.9 in 1900 and 79.7 the ten-year average. The yield indicated by the latest Government figures is 780,000,000 bushels, but while an exceptionally large crop of oats has been harvested there are indications that the quality is deficient. Of the ten States having 1,000,000 acres or upward in oats Iowa is the only State which reports a condition comparing unfavorably with the ten-year average. New York reports the phenomenally high condition of 107, being the highest reported since 1887 and 24 points above its ten-year average. Wisconsin and Ohio each report a condition of 100, Michigan 99, Pennsylvania 98, Minnesota 95 and Nebraska and Illinois each 86, but the Illinois condition is not exceptionally high.

The average condition of barley at harvest is 89.7, against 83.8 a year ago, 70.7 in 1900 and 82 the mean of the averages for the last ten years. Winter and spring rye combined at harvest showed a condition of 90.2, against 84.9 last year, 84.2 in 1900 and 85.4 for the last ten years. The average condition of buckwheat on September 1 was 86.4, against 91.4 on August 1 this year, 90.9 a year ago and 84.7 for the last ten years.

The results of the season are thus shown to be very satisfactory with respect to the quantity of cereals produced. This interests not only the agriculturist, but the railroads, the manufacturers and commercial people generally. At the same time prices keep up to a remunerative point, which is scarcely less important, as farmers are thereby favored with potential purchasing power.

The strike of structural iron workers employed by the American Bridge Company in New Haven, Berlin and other Connecticut cities was declared off Saturday and interrupted work on buildings was resumed. The demand of the men for a nine-hour day and wage scale of 40 cents an hour was conceded.

The Hot Blast Equalizer.

At the meeting of the Iron and Steel Institute at Düsseldorf, Lawrence F. Gjers and Joseph H. Harrison submitted the following results obtained with the hot blast equalizer which was put into operation in May last year at the Normanby Iron Works, Middlesbrough:

The equalizer is much the same shape as a Cowper stove, 20 feet diameter by 55 feet high, built of steel plates and lined with fire brick. A central division wall from the bottom to near the dome divides it into two similar sections, which are filled with fire brick checker work. The hot blast of irregular temperature as it leaves the stoves is made to enter at the bottom of one of these sections. It passes up through the checker work of that section and down through that of the other section, and is passed out at the bottom at a perfectly uniform temperature. It is then carried to the furnace by suitable connections. The excessive heat of the blast given by a stove which has just been put on blast after heating up, when it enters the equalizer, comes at once in contact with the checker work of the inlet section, which has been partially cooled down by the reduced temperature of the blast given by the stove which has just gone off to be heated up. The hot blast parts with some of its heat to the checker work, the temperature of which is thereby raised. As the run of this stove proceeds its heat is lowered, and the temperature of the blast it gives gradually falls below the temperature of the checker work of the equalizer, and the checker work then returns to the blast the excess of heat which it took up in the early part of that stove's run.

There is thus an exchange of heat continually going on between the checker work and the hot blast in either one direction or the other, with the result that the temperature of the blast issuing from the equalizer remains constant, at practically the mean of the varying temperature of the blast given by the stoves when going on and going off blast.

The furnace at the Normanby Iron Works is provided with three Ford & Moncur stoves, the hot blast from which is collected into a common main 24 inches internal diameter, passing behind the furnace and round to the back of the equalizer, being connected directly to it near the bottom. After passing up one section and down the other the blast leaves the equalizer by a 24-inch connection, which, turning upward, has two branches leading off to the horseshoe main round the furnace. In building this equalizer an air space of 2 inches was left between the shell and the fire brick lining, but it was found in working that about 50 degrees F. was lost from the blast by radiation and conduction. To prevent this loss the whole of the outside of the shell was covered 2 inches thick with a composition consisting chiefly of slag wool, with the result that the loss now is below 25 degrees F. In future equalizers it is proposed to pack 2 or 3 inches of slag wool between the shell and the fire brick lining.

After the equalizer had been at work some time a Uehling pneumatic recording pyrometer was installed for making observations of what was taking place. Two fire tubes were put in, one in the hot blast neck at the inlet side of the equalizer, and the other in the horseshoe main round the furnace, both recording at the same time.

Diagrams have been taken by the Normanby Iron Works Company, an upper record showing the varying temperature of the blast entering the equalizer from the stoves and a lower one showing the uniform temperature of the same blast as it leaves the equalizer and goes to the furnace. The "equalized" record is almost a perfect straight line, except for the gaps when the blast was shut off the furnace at casting times. In looking at an unequalized record we find that in some cases, where a freshly heated stove has gone on, the blast temperature has jumped up more than 200 degrees F. in a moment, but by following the same time line on to the equalized record below not the slightest variation is found in the temperature of the blast going to the furnace. This is a most severe test of the application of the principle upon which the apparatus is based, and no doubt it will be agreed that the results are highly satisfactory.

A pair of 24-hour records for June 12, 1902, are very interesting, as showing how the equalizer acts as a sort of "heat buffer" between the stoves and the furnace in case of sudden and excessive rise of temperature of the hot blast from the stoves, and also as a heat reservoir. This pair of records extends from midnight on June 11 to midnight on June 12. About 6 o'clock on the evening of the 11th it was found necessary to stop the engine blowing this furnace for two or three days, and the furnace had to be coupled up to a common hot blast main, serving two other furnaces with blast at a much lower pressure. The result of this was that a much less weight of blast was passed through the stoves per minute, and consequently the temperature of the blast given by them went up by leaps. But the equalized record shows that the equalizer had the effect of checking this rapid rise of temperature, and allowed it to take place gradually over the 24 hours. When the blowing engine was put to work again the "equalized" temperature went down in the same gradual way, while that from the stoves fell rapidly. This shows clearly that the equalizer stored some of the heat from the blast when its temperature began to rise, held it and gave it out again gradually when the stoves' heat fell rapidly two or three days afterward.

From these records, similar ones to which are coming off every day, it will be seen that this apparatus has the effect of converting host blast of very irregular temperature to hot blast of perfectly regular temperature, and thus removing one of the great sources of irregular furnace working. It is perfectly automatic and requires no attention of any kind whatever, and there is no reason to expect that any more repairs will be required to it than to any ordinary hot blast main.

On comparing this system with that of leveling, or reducing the hot blast temperature to the minimum temperature given off by the stoves, by the admission of cold blast, for the purpose of regularity, so largely adopted in America, and to a less extent in this country, it will be seen how very much easier the one is to work than the other. In one case the stoveman has to be continually shutting off a little cold blast every few minutes during the run of a stove and when that stove goes off and another on, he has to open out the cold blast valve again until he finds, by his pyrometer, he has got the temperature he is ordered to keep, and then he begins to go through the same gradual shutting off of the cold blast as before, and so on night and day. In this way a fairly regular blast temperature may be maintained, but it is at the minimum temperature at which the stoves go off blast, and is only possible by the continuous and careful attention of the stoveman.

In the other case a more perfect regularity of blast temperature is maintained without the least attention from the stoveman, and practically at a mean between that at which the stoves go on and go off blast.

It may be argued that in the former case there is always available a higher heat of blast should the furnace require it for a short time. The same is true in working with the equalizer, for by providing a by-pass valve from the hot blast main (before it reaches the equalizer) to the horseshoe main the blast from a freshly heated stove can be made to pass direct to the furnace without going through the equalizer. Or if the reducing system above referred to is preferred a cold blast connection can be made to the hot blast outlet from the equalizer and the temperature of the blast lowered to any extent desired. The cold blast valve, once set to give the proper temperature, would require no further attention, unless a higher temperature was required, when it could be partly or wholly closed. At the same time it does not seem advisable, for the sake of getting a higher temperature now and then, to work the furnace regularly on a reduced temperature of blast.

The second annual meeting of the American Aluminum Association is to be held on the 19th inst at Pittsburgh, the headquarters being at the Hotel Henry.

The Iron Age

New York, Thursday, September 18, 1902.

DAVID WILLIAMS COMPANY, - - - - - - - - PUBLISHERS.
CHARLES KIRCHHOFF, - - - - - - - - - EDITOR.
GEO. W. COPE, - - - - - - - - - - ASSOCIATE EDITOR.
RICHARD R. WILLIAMS, - - - - - - - - - HARDWARE EDITOR.
JOHN S. KING, - - - - - - - - - - BUSINESS MANAGER.

Relieving the Money Market.

Secretary Shaw's anticipation of interest releases about $4,000,000 and to that extent relieves the pressure for money in New York, but it cannot be said that the sum is a large one. He also expects to release nearly $4,000,000 by depositing public funds with banks that now hold bonds which are not pledged for deposits or circulation. The banks have little or no motive for holding free bonds; the whole amount so held is certainly small, and this is scattered pretty well over the country, so that funds deposited with such banks might be some time reaching any point where they were especially needed. The remaining steps that the Secretary might take are to offer any amount of money desired to banks that would deposit the required security for it; to buy bonds, which never has produced very marked results because the bondholders are not generally short of money and they are more likely to put the money they get from the Government into some other gilt edged permanent investment than to turn it over to the banks, and to resume the refunding operations which Mr. Gage suspended. Mr. Shaw shows no disposition to buy bonds, one objection to which is that the purchases tend to raise the price and tempt banks to sell the bonds and retire their circulation. He gives no intimation as to the refunding operations, and he will probably wait to see what effect is produced by the deposits he now offers to make before he makes his proposition broader.

The West reports a good supply of money, including, however, withdrawals from Eastern centers, which have contributed to the stringency in this section, and the moving of the crops more slowly than usual on account of the cold weather. The West is in a better shape to handle the crops than in previous years, but the harvests are much larger this year than last, and in the summer a good deal of Western money is in New York, to be withdrawn as fall approaches.

The reason for appealing to the Treasury for relief is that in August and half of September the Treasury contracted the currency $10,000,000 by its collections of revenue, and there is no considerable amount of relief to be obtained from the banks. Mr. Shaw's proposition was that banks should borrow bonds to deposit for circulation. It has already been ascertained East and West that little relief can be obtained in this way; the bonds cannot be borrowed. If they could there would be the problem of getting rid of the emergency circulation when the emergency was over with a law prohibiting the retirement of more than $3,000,000 a month. The banks do not care to pay tax on circulation after the opportunity of keeping it busy is closed.

One other resource is the importation of gold. Shipments from Australia have already been announced and from Europe they were expected before the Secretary's action. Only a high price of money here will bring gold from Europe, and if the action of the Secretary is enough to reduce the price of money the gold importations will not occur.

It is true that the stringency has been confined mainly to New York, and in New York mainly to Stock Exchange operations, but it has not been confined entirely to these; a stringency in the speculative money market does not occur without some influence upon the supply of money for ordinary mercantile operations and the rates charged therefor. At this season of the year there is a special need of money in the agricultural regions, and a year of good harvests is pretty certain to stimulate the buying of securities. The West and South are accustomed at this season to withdraw the funds they keep here in dull times, the presence of which undoubtedly makes the money market too easy and stimulates speculation. As the Treasury is holding a large amount of money and is increasing its holdings at the moment money is diminishing in the banks and the demand for it is greatest, it is natural that there should be a demand for such moderate relief as the Secretary of the Treasury can lawfully extend, and there is now some discussion of the merits and demerits of the independent Treasury or the sub-treasury system. That public sentiment is much less attached to the independent Treasury than it was once is shown by the fact that for weeks $120,000,000 of public funds have been kept on deposit with banks that were willing to give security therefor, and there has been no word of criticism of the Government.

The Cotton Outlook.

The new cotton year began on September 1 and during the last two weeks various accepted authorities on the cotton crop have issued their annual statements. According to the *Financial Chronicle* the 1901-1902 crop is 10,701,453 bales. The New York Cotton Exchange places it at 10,768,195 bales, while the secretary of the New Orleans Cotton Exchange believes the yield to have been 10,680,680 bales. Accepting these estimates, the crop now coming forward will not differ materially from that of 1900-1901. During the past ten years the smallest yield was in 1892-3, 6,717,142 bales, and the largest crop was in 1898-9, when 11,235,383 bales were gathered. The report of the Department of Agriculture issued September 3 indicates a serious deterioration of the growing crop during the month of August and the condition inferior to that at the same date for many years. The figures show a decline of 16.9 points, but the trade seem very much averse to accepting the department's statement. Indeed, the report has called forth so much criticism that the statistician, Mr. Hyde, is reported to contemplate making a statement concerning it. The great deterioration of the crop during August is ascribed to severe drought and the boll weevil.

A feature of special interest and significance concerning the domestic distribution of cotton during the year 1901-2 is that the Southern mills had increased their takings by 343,000 bales, while Northern mills had increased theirs only about 72,000 bales. So that, according to the *Chronicle*, the South now uses not much less than half the cotton consumed in this country. During last year Southern spinners took 221,525 bales less than did the Northern mills, but two years previously the takings of the South were 592,724 bales less than the North. The number of spindles in the world has increased 9,500,000, or nearly 10 per cent., in the last four years. While the absolute increase has been nearly the same in America as in Europe—about 4,000,000 each—the relative number has been much larger in the United States, being not far from 23 per cent. In every Southern State there has been an increase in the cotton consumption during the year, 39 new mills, operating 543,514 spindles, being credited to that section.

There could scarcely be more diametrically opposite conditions prevailing in two industries than exist to-day in the cotton goods and the iron and steel industry. Foreign trade is the life of the cotton industry at the present time, spindles being already in oversupply to meet home consumption when at its maximum and certain to go on increasing year by year, and larger fields abroad must be found for the surplus products. The reverse is the condition in the iron and steel industry for the present at least.

The Treasury Gold.

It is worthy of more than passing notice that the amount of gold in the United States Treasury at the present time exceeds that of any previous time in the history of the country, and with one exception, it is larger than that held by any country at any time in the history of the world. The single exception referred to is that of Russia when that country was preparing to resume gold payments about eight years ago, at which time the Russian Treasury is said to have held $598,000,000 in gold. On September 6 the United States Treasury contained $573,936,194, an increase of over $79,000,000 since July 1, 1901. The stock of gold in the Treasury is now being added to at the rate of $200,000 to $300,000 a day, with the prospect that the movement will continue for some time to come. The Treasury officials look upon the accumulation of gold as evidence of prosperity and confidence in the stability of the country. Gold and silver certificates and United States notes are being issued in place of the gold coin and bullion.

The large increase in custom duties paid in the United States thus far in September is regarded by Treasury officials as not only satisfactory, but normal, and upon the basis of present receipts and expenditures it is estimated that the surplus for the year will be about $35,000,000. For the first week in September receipts have been about $2,500,000 larger than during the corresponding week last year. The only unusual expenditures by the Government will be on account of war in the Philippines. While the outlay for the army and navy has been unexpectedly large recently, it is believed that there will be a decided decrease in a very short time.

Handsome Returns from Agriculture.

That the prosperity of this country is due to the great purchasing power of the people needs no elaborate argument. It is a self evident proposition. Whether the laborer, the skilled mechanic or the farmer be considered, it is found that his remuneration is much above the rate prevailing in other countries. He earns more and therefore has more to spend for necessities, luxuries and pleasures. But while all classes of workers contribute to the wealth of the country, they depend primarily on the results of the labor of those who develop its natural resources in the shape of the products of the farm, forest and mine. First in importance among these are the farmers. Our columns this week contain much more than usual relative to the farming interests. This is in accordance with the fitness of things, as the crop season is now drawing to a close and we are able to form a fairly accurate opinion as to the yield of the great staples. The results of this year's work of our agriculturists are satisfactory, as practically all crops are equal to or above the average of the past ten years. Thus the basis of continuing prosperity has been well established, and those who depend most directly on the trade of farmers are particularly gratified at the outlook.

In this connection an instructive statistical demonstration comes from North Dakota. According to crop experts, the value of farm products in that State this year will be upward of $100,000,000. The number of families in the commonwealth is placed at 75,000. This year's crops therefore represent an average of $1400 for each household in the entire State. It is asserted that such a showing has never before been made for any considerable aggregation of people. While North Dakota is essentially an agricultural State, it includes quite a number of thriving cities and towns whose inhabitants are engaged in other occupations than agriculture. To show such an average for every family in the State from farm products alone is undoubtedly a remarkable achievement. Its significance, however, lies in the fact that the purchasing power of the citizens of that State is fixed at a high rate for the coming year. They will have an abundance of money to gratify their tastes and to improve their surroundings. As North Dakota is a typical agricultural State, it may be accepted as a fact that a similarly satisfactory showing could be made for the others. North Dakota is not an exception. Farming communities everywhere are enjoying good times, and farmers will continue to be heavy consumers of all kinds of manufactured commodities. The partial failure of the corn crop last year had happily no effect in checking enterprise or lessening confidence. With good crops this year and the good prices for farm products now prevailing, one great cause of anxiety has been removed. The basis for another year's very good business has been established, and if the fair prospect is blighted it will be due to some cause not connected with agriculture.

CORRESPONDENCE.

Arbitration in the Scotch Iron Trade.

To the Editor: I observe in your issue of the 11th inst. the report of adjustment by arbitration of the claim of David Colville Company, Dalziel, Scotland, for reduced wages from their rolling mill workmen on account of improved machinery and increased output. Possibly it would be interesting in these days, when arbitration is so much advocated briefly to review the origin of this system there seeing that your article shows its most recent development.

During your Civil War the rolling mill men of England received three advances of 10 per cent. each time. Those in Scotland received two similar advances; the war terminated before the third had been conceded. Ten per cent. was at once deducted from the Englishman's wages. The same was claimed off the Scottish contingent, who had never received it. A strike ensued, every mill was closed. Mr. Burns, attorney for the employees, and Mr. Strachan, attorney for the workmen, convened a meeting of one representative for the employers and one for the employees at the Bedford Hotel, Scotland. That body selected David Colville, Sr., Cassels, Ferrie and Beardmore and four workmen, of whom I was one, as a committee to devise a basis of settlement. Their efforts resulted in an acceptable termination of that dispute.

After that a few of the workmen, both in England and Scotland, determined to advocate settlement of all disputes without strikes by conciliatory methods. They secured a printing press and established a monthly journal to advocate their principles and disseminate trade news, and were spoken of as "cranks" and "enthusiasts." Nevertheless, by degrees not only the thinking men but also the employers adopted their views and the "Board of Arbitration and Conciliation" came into existence. All disputes during these 40 years or so of any importance have been decided by this means. Many eminent jurists, members of Parliament, &c., whose in-

tegrity is above reproach, have considered it an honor to act as umpire, and none of their decisions have been violated. Now, you give a *résumé* of the latest case.

After all these years I am still of the opinion that this is the most equitable solution of these labor disputes, and that no man who claims to be guided by the spirit of equity would hesitate one moment to terminate the monetary loss to workmen and the public—the conflicting antagonism and even loss of life pertaining to strikes by this means. JOSEPH PARKES.

TOLEDO, OHIO, September 12, 1902.

The Economy of the Long Cooling Bed.

To the Editor: In your last issue the unscientific engineer has vigorously and impartially roasted several of his professional acquaintances. In toasting us on our long hot bed, he made a simple computation on crop end saving—a little over $1800 saving on 75,000 tons of ¾-inch rounds.

This material is to-day listed at 1.60 cents per pound, equal to $35.80 per gross ton. On this basis he allowed $\frac{1800}{75{,}000 \times 35.80} = 0.000625$, or one-sixteenth of 1 per cent., advantage. Calling scrap worth half price would mean that he held one-eighth of 1 per cent. more of his material at bar price instead of scrap price. This scrap of one-eighth of 1 per cent. is one end of a 200-foot bar, or 3 inches crop. Is this all the saving on a long bed?

An extended examination of shipments of this class of material from the two largest producers clearly showed that 70 per cent. of the tonnage was cut to specified length. It also showed that over half of the tonnage was cut to 13-foot lengths and longer, or the average length was 13 feet. Shorts would not be accepted. Hence, in addition to the crop there was always more or less of a short, which would average $\frac{13}{2} = 6.5$ ft. As this 6.5 feet short applied on 70 per cent. of the tonnage, $6.5 \times 0.70 = 4.55$ feet average short for every bar. On a 200-foot bar this amounts to 2.25 per cent. On a 400-foot bar it amounts to 1.125 per cent., which is the amount of material sold at full price instead of half. This 1.125 per cent. is additional to the 3-inch crop, or 0.125 per cent., so that total crop and short returns are 1.25 per cent. instead of 0.125 per cent., or ten times as much. Ten times $1800 is $18,000, which is not such a bad return on $50,000.

Customers will now frequently accept their shorts, as the percentage has been so much reduced. Incidentally it may be recalled that only a few years ago when billets were ordered to finish short bars to weight or length it was regular practice to add 10 per cent. for losses.

Is the crop or short saving the only advantage resulting from long lengths? If a mill changes from 400 to 200 foot length it is clear that every man from the furnace charger to, but not including, the shearman must do just twice the work to get out the same tonnage. Would you expect them to do twice the work for the same pay?

Another question, Can the same tonnage be gotten out of a mill on 200-foot lengths as on 400-foot? No mill can work at 100 per cent. efficiency. Will the tonnage be increased if one-half of the time lost between pieces be eliminated?

The advantages of the long bed are:

a. Reduced labor per ton.

b. Increased tonnage due to less lost time and lessened exhaustion of the men.

c. Reduced scrap.

Taken altogether, we think the long cooling bed will pay for itself in a reasonable time. Respectfully,

V. E. EDWARDS,
Mechanical Engineer, Morgan Construction Company.

WORCESTER, MASS., September 16, 1902.

Large Order for Gas Producers.—The Forter-Miller Engineering Company, engineers and contractors, Westinghouse Building, Pittsburgh, have received an order for 22 Forter water sealed gas producers from the Alabama Steel & Wire Company, to be erected in the new open hearth steel plant which that concern will build at Birmingham, Ala. In the past year the Forter-Miller Engineering Company have taken contracts for about 60 of the Forter water sealed gas producers, among these orders being 4 for the Riverside Works of the National Tube Company, at Wheeling, W. Va.; 16 for the Inland Steel Company, at Chicago; 2 for Allegheny Steel & Iron Company, at Tarentum, Pa.; 5 for Latrobe Steel Company, at Latrobe, Pa.; 7 for the new tube mill of the Susquehanna Iron & Steel Company, at Columbia, Pa., and 4 for the new works of the C. Pardee Company, at Perth Amboy, N. J.

PERSONAL.

F. M. Minninger, who has been connected with the Chicago sales agency of the National Tube Company for many years, has been appointed sales agent at Chicago for the Youngstown Iron Sheet & Tube Company, with offices at 1136 Stock Exchange Building.

Otto Diechmann, formerly Otto Diechmann & Sohn of Berlin, sailed on Tuesday for Germany after a prolonged stay in this counrty. Mr. Diechmann has been appointed exclusive agent in Germany and Austria-Hungary of the Browne & Sharpe Mfg. Company of Providence, R. I., his address being N. W. 7 Postlagernd, Berlin. Mr. Diechmann has also the exclusive agency of the Potter & Johnston Machine Company of Pawtucket, R. I., and F. E. Reed Company, Worcester, Mass. He will also sell machinery for Pratt & Whitney, Detrick & Harvey Machine Company and O. S. Walker & Co.

E. D. Clarage, manager of the Cleveland, Ohio, branch of the Crucible Steel Company of America, sailed for Europe on Friday by the "Augusta Victoria."

The announcement was made at the Düsseldorf meeting of the Iron and Steel Institute that Andrew Carnegie will be its president next year.

Alexander Thomas has been appointed secretary of the Crucible Steel Company of America, with offices in the Frick Building, Pittsburgh. Mr.. Thomas will continue to act as superintendent of branches and agencies.

Edgar Murray, formerly with the Carnegie Steel Company, at Pittsburgh, has been made purchasing agent of the Youngstown Iron, Sheet & Tube Company, at Youngstown, Ohio.

Thomas Robertson, 17 years foreman of the foundry department of the Atlas Engine Works, has left to become superintendent at the Gould Mfg. Company, Seneca Falls, N. Y. The 60 foundry men under him gave him a Masonic ring.

James W. Copeland, 934 Equitable Building, Denver, Col., has been appointed sole agent for the State of Colorado for the Scaife and We-Fu-Go water softening and purifying systems, manufactured only by William B. Scaife & Sons Company, Pittsburgh, Pa. Mr. Copeland was formerly located at St. Paul, but has recently opened an office in Denver to further the various interests which he represents, and is well known throughout the West in mechanical and engineering circles. Mr. Copeland has always given the subject of water purification considerable attention.

The Canonsburg Steel & Iron Works.—The Canonsburg Steel & Iron Works, recently organized at Canonsburg, Pa., have purchased the rolling mill at Canonsburg, Pa., formerly owned and operated by the American Tin Plate Company, and previous to that by the Canonsburg Iron & Steel Company of Pittsburgh, Pa. They are now engaged in improving and repairing the works and expect to have the plant in operation about January 21, 1903. They propose to make steel and iron sheets used for deep drawing, stamping, enameling, tinning, galvanizing, japanning, bicycles, show cards, stove and range work, tune sheets, &c. John F. Budke, formerly connected with the Canonsburg Iron & Steel Company in the capacity of general superintendent of the works, is the president and general manager of the company. The company have a capital of $250,000, and

the officials are: John F. Budke, president; John M. Watson, vice-president; William H. Paxton, treasurer, and George W. Retberg, secretary.

Iron and Allied Trades in Scotland.

Usual Currents of Trade in Pig Iron Upset.

GLASGOW, September 4, 1902.—The tightness of the position in America seems to have upset all the usual currents of trade in so far as pig iron is concerned. It is being turned about in a most unaccustomed manner. We are importing from Canada and Russia, while exporting as hard as we can to Canada and the United States, as well as sending some to Russia also. Russia is at the same time shipping largely to America, and not only is Germany getting rid of her own surplus make in America, but she is sending over to you iron she bought from us a year or two ago and has been unable to consume. And all the time Germany is still buying from Great Britain, though, of course, not in such quantity as in recent years. In the month of July, for instance, although busy executing American orders, Germany took from us some 20,000 tons (direct and via Holland and Belgium). It is true that this is nearly one-half less than she took in the same month of last year and not one-third of what she took in July, 1900, still under the circumstances it is considerable. In July the United States took 59,440 tons and Canada 3986 tons, and when the figures for August are made up they will be found to be much larger than these. Then in July we imported 911 tons from the United States and 20,750 tons from Canada, Russia and Germany. Of course all these cross currents are very perplexing to the uninitiated and are even surprising to the experienced members of the trade, but the times are abnormal, with a production by America of 18,000,000 tons per annum, which is still insufficient for her consumption, while all other producing countries are making more than they want.

The position in Scotland and Cleveland is that smelters are delivering to buyers as fast as they can make and have no time to accumulate stocks. Every little pressure for shipment necessitates some withdrawal from the public stores, which now contain only 42,000 tons at Glasgow, 128,000 tons at Middlesbrough and 27,000 tons at Furness, &c. From these three producing areas the shipments for the year up to the end of August have been as under, in comparison with last year:

From	1901. Tons.	1902. Tons.
Scotland	179,533	221,605
Middlesbrough	721,339	701,301
Cumberland	219,036	269,337

And the following are the furnaces now in blast in comparison with last year:

		1902.	1901.
Scotland	Ordinary	37	35
	Hematite	45	44
	Basic	5	2
		87	81
Cleveland—Ordinary and hematite		79	84
Cumberland—Hematite		37	25
Total		203	200

There are at present more furnaces on hematite in Cleveland than last year, and some of these would be turned on ordinary iron, for which there is a larger demand just now, but for the scarcity of Cleveland iron ore. Were the supplies of this ore to be increased more furnaces would start producing "Cleveland" brands. Scotland is drawing largely upon Cleveland for foundry iron, just as America is drawing G. M. B. from Scotland. More tonnage is being inquired for, both from the Clyde and the Tees, to Baltimore and Philadelphia, and there are more inquiries in the market for steamers to take pig iron to New Orleans and Pensacola, which is a new development. The prices of warrants are as follows: Scotch, 57 shillings 6 pence; Cleveland, 53 shillings, and Cumberland hematite, 61 shillings. Cleveland is relatively dearer, being now only 4 shillings 6 pence under Scotch, and if the difference declines so also will the shipments from Cleveland to Scotland, which up to now are 30,000 tons ahead of last year. The present price of Scotch warrants compares with 53 shillings 9 pence at the same time last year, but with only 49 shillings in January last. As compared with Cumberland warrants Middlesbrough hematite is 57 shillings for mixed numbers and Scotch hematite is 62 shillings delivered to the steel works. The rise in prices is in respect to the American demand, but it will serve to still further check the demand. As for our home trade, pig iron is now altogether too high in proportion to the prices obtainable for finished iron and steel, which in turn are kept down by German and Belgian competition.

The Steel Trade.

American orders for steel, both crude and finished, have without doubt added greatly to the activity in our Scotch steel works, although the extent of that business has been much exaggerated by Dame Rumor. But for these orders it is probable that shipbuilding material would be cheaper than it now is. Steel ship plates at £6, less 5 per cent., as compared with £5 15s., less 2½ per cent., in the North of England, are not dear, but they are not cheap enough to make the cost of building cargo carrying steamers sufficiently low to give a fresh impetus to building. And that the steel trade, though busy, is not very lucrative at the recent range of prices must be concluded from the report of the Steel Company of Scotland, who are able to pay no more this year than 2½ per cent. to their shareholders, although more finished product has been turned out of the works during the past year than in any previous record. Indeed, there would have been no profit at all but for some new economies effected in the methods of manufacture. German steel is not as yet coming to Scotland, but German Bessemer billets are being offered at £4 10s. to £4 12s. 6d. per ton, delivered in England, against the English price of £4 17s. 6d. to £5. Belgian steel ingots are being offered at £4 15s., f.o.b. Antwerp, and Belgian iron bars are being sold in England at £5 15s., the Middlesbrough price for which is £6 5s.

Shipbuilding.

Shipbuilding is more depressed in England than in Scotland. The decision of the South Durham Iron & Steel Company to close their works at Stockton is ascribed to the inaction of the shipyards in the North of England. There is as yet no such inactivity here, for the Scotch shipbuilders have been turning out tonnage pretty busily of late. During the last week or two the launches have been especially numerous. In July the yards turned out 19 vessels of 32,000 tons and in August 22 vessels of 46,900 tons, these figures comparing with 52,900 tons and 55,000 tons respectively in July and August of last year. The total output of the Scotch yards for the eight months ending with August was 338,800 tons, which is only slightly behind the total of 354,800 tons for the corresponding portion of last year and a good deal ahead of all previous years. But while there was some revival of demand in July for cargo boats, that demand has suddenly ceased, which is not to be wondered at considering the depressed state of the freight markets and the arrest in the decline of building costs. In July new contracts were booked to the extent of 45,000 to 50,000 tons of all classes of vessels, but in August the new contracts booked did not exceed about 15,000 tons, two-thirds of which consisted of one 10,000-ton liner for the P. & O. and the rest of small craft for well established regular services not affected by the current of trade. Thus against 79,000 tons of new vessels put into the water during the two months the shipbuilders have booked only 60,000 to 65,000 tons of new work to take their place on the stocks. The output of September will be greater because several very large vessels are ready for launching, so that by present prospects at the end of the year our shipbuilders will have considerably less work on hand and on their books than they had at the beginning of the year. Of course there may be a revival in the demand before winter, but so far there is no indication of any, and the trades unions are getting anxious at the prospect of a lot of men being paid off during the winter. Up till now there has been plenty of employment for shipyard workers and wages have not been reduced since the industry was

on the boom, but less prosperous days for both masters and men seem at hand.

The Coal Trade.

One thing which helps to make ship owning unremunerative just now, and therefore to restrict the ordering of new ships, is the comparatively high price of bunkering coal. Freights may have been as low before, but coal then was cheaper, and coal is relatively dear because wages are high. All over the country the miners are revolting from the principle of the sliding scale, according to which wages are automatically regulated in agreed proportions as prices move up and down. The men, or some of their leaders, are possessed of the idea that wages ought to regulate price, and that coal owners can get what price they like to ask for their coal provided they all act together and refrain from cutting against each other. It is a pretty theory, but it won't wash. Still the miners have succeeded in establishing a minimum wage in Scotland and in the Midlands of England, and now they are endeavoring to do the same in South Wales. Along with a fixed minimum wage they want boards set up, composed of equal numbers of representatives of coal masters and miners, to adjust rates from time to time, not merely according to the fluctuations in price, but in the light of the conditions and prospects of trade. The system has worked well enough in Scotland in averting strikes since it was instituted, but it is not operating to the benefit either of the producers or the consumers of coal. It has kept prices of coal too high in relation to industries. The coal owners have been trying to get the wage down to the minimum rate, but have been obstructed every time by the representatives of the men on the Board of Conciliation. Another claim for reduction is now pending settlement by an arbitrator, acting as neutral chairman of the joint Board of Conciliation. But this introduction of an outsider to come between them and their employees when a wage bargain is to be made is just what the Welsh coal masters object to.

The most notable thing in the Scotch coal trade of late has been the formation of a combine under the auspices of the United Collieries, Limited, whose headquarters are in Glasgow. The capital is £3,000,000 and the combine now own some 30 collieries in the Lanarkshire coal field, with a producing capacity of 6,000,000 tons per annum, or nearly one-fifth of the whole output of Scotland. An extension of this combine by amalgamation with two or three of the larger colliery companies is not improbable. The objects aimed at are the discontinuance of undercutting by small individual producers, economy in colliery and commercial management and a stronger hand in dealing with the men. B. T.

Important Patent Decision on Beam Rolling.—Every rolling mill in the United States rolling ingots into structural shapes is infringing on the patents of John Brisbin and Antoine Vinnac, according to a decision by Judge Buffington in the United States Circuit Court at Pittsburgh on September 15. Brisbin and Vinnac, both rollers, invented part of the present system of carrying the ingot on a table laterally and vertically, for which they received a patent July 20, 1886. They also secured an interest in a patent granted Patrick Hanley and Francis M. Ritchey November 16, 1886. The plaintiffs brought suit against the Carnegie Steel Company, Limited, for infringement of patents in May, 1897. Judge Buffington heard the arguments last spring. The Carnegie Steel Company's claim was invalidity of the patent and noninfringement. Judge Buffington held that in view of the great advance in the system of rolling structural shapes it would seem just that those who have from an inventive standpoint brought about such advance should share proportionately in the gains thereof. An appeal from the decision will be taken.

The Premier Steel Company.—The receivership of the Premier Steel Company, pending since 1893, is finally wound up. There has been much litigation. H. E. Southwell of Chicago claimed a prior lien. The Supreme Court decided against him. He purchased 90 per cent. of all claims, the court ruled in his favor, his big claim was settled, and other creditors got 4 7-10 per cent. dividend. The case involved $800,000. Thirty or 40 years ago the plant was one of the largest rolling mills in the West. It declined after the establishment of mills nearer the ore supplies and the coal fields. Many efforts were made to revive it. The court ordered it sold five years ago, and W. J. Carlin, Pittsburgh, was the best bidder, his offer being $125,600. The Central Steel & Iron Company were organized and part of the great plant was put in operation for six months. It was then dismantled and the machinery sold to a Canadian company. The real estate is now owned by Crawford Fairbanks of Terre Haute, D. P. Erwin of Indianapolis and one or two others. Following the dissolution of the receivership comes word from John D. Briggs, Chicago, that he and others will convert the property into a large foundry if Indianapolis people will take $25,000 of stock.

OBITUARY.

THOMAS E. CHANDLER, of the Chandler-Taylor Company, manufacturers of engines and boilers, died at Indianapolis of septacæmia. He was 71 years old. He was born in the same house as Thaddeus Stephens at Lancaster, Pa. His first employment in the West was as superintendent of rolling mills at Burlington, Iowa, in 1859. Not liking the place, he started home, stopped at Indianapolis and accepted a place as superintendent of the Indianapolis Rolling Mills. Later he became a partner with Chas. R. Wiggins and established the plant which developed into its present large proportions. He held his job at the rolling mills by day and worked in his own plant at night. He bought his partner out in 1864. Later Franklin Taylor became his partner and in 1888 their sons were taken in and a company was incorporated. At the rolling mills he invented a process of rolling and rerolling iron rails at one heating.

SIR FREDERICK A. ABEL, former president of the Iron and Steel Institute and of the British Association for the Advancement of Science, and prominently identified with other scientific bodies in the United Kingdom, died in London on September 8, aged 76 years.

JAMES DUFFY, president of the Duffy-Trowbridge Stove Company, Hannibal, Mo., died suddenly last week from heart disease at his home in Hannibal, aged 75 years. He was born in Ireland and came to this country when a child. He had been engaged in the stove manufacturing business since 1841.

Freights to Colorado Points.—(*By Telegraph.*)—CHICAGO, ILL., September 17, 1902.—The traffic managers of the Western railroads held an important meeting here yesterday to adjust the differences because of the rate war on various articles of freight to Colorado points, which have caused much trouble to shippers during the last three weeks. On iron and steel the rates have been from 40 to 50 per cent. below normal tariff, and it was found that several roads had made contracts at the low rates, especially on structural iron, which cannot be terminated until January 1 next. It was agreed that all reduced rates to Colorado points now in effect will expire December 31, 1902, and that no further contracts on iron or other goods shall be made extending beyond December 31, 1902.

There will be a considerable amount of remodeling to be done to the buildings recently purchased by the Fournier-Searchmont Automobile Company, at Trainors, a small hamlet below Chester, Pa. The work will be commenced at once, and it will be but a short time before everything is in readiness for the new enterprise to install the machinery for the manufacture of automobiles.

Progress is being made on the new forge works which are under construction for George K. Crozer, Jr., in Chester, Pa. The building will be 60 x 90 feet. The plant will be equipped with the best of machinery and will be one of the most modern of its kind in that section.

The Sheffield Coal & Iron Company.

The sale of the furnace property at Sheffield, Ala., and of the Russellville ore mines of the Sheffield Coal, Iron & Steel Company, owned by the Tennessee Coal, Iron & Railroad Company, has been ratified by the Board of Directors of the latter company. The purchasers are the Blast Furnace Syndicate, of which William Edenborn is chairman. This company, who have a capital of $2,500,000 of common stock, subscribed by a number of capitalists, among whom are William Edenborn of New York, I. L. Ellwood of Chicago, Alfred Clifford of St. Louis, James Gayley and W. R. Walker of New York, Thomas Dolan of Philadelphia, Charles Allis and William J. Chalmers of the Allis-Chalmers Company of Chicago, H. Belmer of the Belmer Machine Company, Cincinnati, Ohio, G. H. Timmermann of the St. Louis Iron & Machine Works, St. Louis, Herman Sielcken of Crossman & Co., New York, and others.

This organization has grown out of the United States Iron Company, organized some years since by John W. Gates, Isaac L. Ellwood and William Edenborn, to acquire a number of ore properties in Tennessee. Some time since Mr. Gates parted with his interests to Mr. Edenborn and is no longer identified with the concern. The property includes mines at West Point, the Smith mines near Lawrenceburg, Tenn., and mines in the Russellville district. The United States Iron Company developed the mines, put up three washers to handle the brown hematite and shipped ore largely to the furnaces at Sheffield, Ala. The question arose, in the further development of the property, whether it would be expedient to erect blast furnaces. It was finally decided to acquire the three Sheffield furnaces. One of these has been in constant operation for some time. It was blown out for repairs in August, but has just been relighted. The blowing power being inadequate to operate the other two, there have just been purchased two large blowing engines supplanted by the sellers by more modern and more powerful engines. These will be erected at once, and since the lining for the second stack is on the premises, it is probable that the second stack may be started without delay.

The Blast Furnace Syndicate have also purchased from General Ayres of Big Stone Gap, Va., the property of the Stone Gap Colliery Company, located in the Stonega district. This comprises over 6000 acres of coal lands and also the Wise Terminal Company line of road about 6 miles long from Norton, Va., to the mines near Wise Court House. Norton is the junction point of the Louisville & Nashville and the Norfolk & Western railroads, so that the company can ship over the former to Sheffield, Ala., or can reach the markets served by the Norfolk & Western Railroad. The Stone Gap Colliery Company had practically completed the opening of the property. There will be built at once 300 coke ovens to supply the Sheffield plant with fuel from these mines.

The new company having now acquired these different elements toward rounding out their operations will probably be known as the Sheffield Coal & Iron Company. The organization, so far as the election of officers is concerned, has not yet been perfected.

Shenango Valley Iron Notes.

The New Castle mills are all running with the exception of the nail and tin plate plants. Sharon plants are all busy, and the same is true of the several mills at Ellwood City.

The East End Street Railway Company of Sharon have let the contract for the construction of about 10 miles of their new road, from Sharpsville to West Middlesex, to William McIntire, Jr., of Sharon, and Harry G. Hamilton of Youngstown, Ohio. Work will begin at once.

John Stevenson, Jr., of the Sharon Steel Company has returned from a visit to the steel company's ore mines in Minnesota.

Important business interests of New Castle are bewailing the fact that New Castle has become known as one of the strongest "union" towns in the country. For several years the large nail and rod mills of the American Steel & Wire Company have been standing idle, for the reason, it is pretty generally understood, that the owners could not operate the plants peaceably. These are among the largest and finest plants of the kind in the world and they are standing idle at great loss to the city. The tin plate mills are closed down indefinitely, but it is the very general opinion that the 25 per cent. reduction will eventually be accepted at these mills. Unionism has been very strong in the Shenango Valley, but there is no doubt that it is at present losing ground.

MANUFACTURING.

Iron and Steel.

The Round Mountain cold blast charcoal furnace, at Round Mountain, Cherokee County, Ala., is reported to have been sold to the W. J. M. Gordon Chemical Company, who propose to put it in operation. It has been idle since 1896.

The New Castle Forge & Bolt Company, New Castle, Pa., organized in December, 1901, have their plant now almost completed. It is fitted up with the latest improved machinery for turning out bolts, rivets, chain and special forgings to order. They found business so brisk that it has been necessary to put on double turn, and they are now running full crew day and night. The prospects for the future are very bright.

The Norwalk Steel & Iron Company, Norwalk, Ohio, will soon begin the erection of a large machine shop, which will be equipped throughout with modern machinery and an office building. The company are rapidly completing their new plant and expect to be making steel this coming winter or early spring.

The Detroit Steel & Spring Company, Detroit, Mich., are building an addition, 75 x 150 feet, at the rear of their plant.

The Warner Iron Company, owners of the Cumberland Furnace, at Cumberland Furnace, Tenn., have recently put in three large boilers, 30 feet long and 60 inches diameter, as an addition to their boiler capacity.

The report that the Carnegie Steel Company have drawn plans for two large finishing mills and another open hearth plant, to be built at the Homestead Steel Works, is untrue. The only new work contemplated at Homestead at present is a large angle mill. The excavating has been done for this new mill and plans for its construction are now being made. Other than the above no new erection of any kind is planned for the Homestead Works.

The Union Steel Company of Pittsburgh will adopt electrical power for distribution for their new mills now building at Donora, Pa. The power will be generated by steam from the waste gases from the blast furnaces, and will be distributed in the form of alternating current to rotary converters at the mills, where it will be used largely as direct current. The Union Steel Company have recently purchased from the Westinghouse Electric & Mfg. Company of Pittsburgh two 800-kw. A. C. generators, one 800-kw. A. C. generator, and five rotary converters.

Contracts for part of the equipment of the new plant of the United Steel Company, to be erected at Canton, Ohio, from plans prepared by Victor Beutner, Westinghouse Building, Pittsburgh, have been placed. The engines will be furnished by Russell & Co., Massillon, Ohio: the boilers by the Pittsburgh Gage & Supply Company. These will be the Lynn tube type, made by the Tudor Boiler Mfg. Company, Cincinnati, and will aggregate 1000 horse-power. The contract for the cranes was awarded the Morgan Engineering Company, Alliance, Ohio.

Some excellent records for production have recently been made at the Bellaire Steel Works and blast furnaces of the National Steel Company, at Bellaire, Ohio. On August 20 the steel works turned out 1030 tons of sheet bars and 16 tons of slabs, making a total of 1046 tons. In the week of August 20 5698 tons of steel were finished, beating their best previous record for one week by 264 tons. On August 20 the two blast furnaces at this plant made 790 tons of Bessemer iron, No. 1 stack turning out 398 tons and No. 2 392 tons. In the week of August 20 both stacks made 5036 tons. In the month of August there was turned out at these two blast furnaces the largest amount of pig iron ever made by them in any one month, the total output of the two stacks in August having been 21,118 tons. N. M. Petersen is general superintendent of the Bellaire Steel Works and blast furnaces.

The United States Works of the American Tin Plate Company, at Demmler, Pa., are practically idle. This plant contains 11 sheet and pair furnaces, 6 annealing furnaces, 11 hot and cold mills, and has a weekly capacity of 7000 boxes of tin and terne plate.

The National Works of the American Tin Plate Company, at Monessen, Pa., are being operated to full capacity and have not been affected in any way by the shut down at other tin plate plants. The National Works contain 24 sheet and pair furnaces, 6 annealing furnaces and 24 hot and 18 cold mills. The output of the plant is 50,000 gross tons annually of black plate for tinning on triple turn, and 20,000 boxes weekly of tin and terne

plate, running double turn. P. E. Donner is manager of this plant.

The Sligo Iron & Steel Company of Pittsburgh have been organized and applied for a charter. The incorporators are Henry A. Davis, Christopher Magee, Jr., and William M. Galbraith.

The Crucible Steel Company of America of Pittsburgh have about completed the new wire mills and cold rolling departments, which have been under way for a year or more at the Spaulding & Jennings plant, Jersey City, N. J., the last of the machinery and appliances being now in process of installation. It is expected that these mills will be in operation in October. Independent motors are largely employed. Cold drawn bars and rods, cold rolled strips and shapes and drawn wire of every description, tempered, untempered and annealed, will be produced.

The first six months' business of the Parkersburg Iron & Steel Company, Parkersburg, W. Va., was very pleasing to the stockholders. The new bar mill was put in operation September 8, and is working splendidly.

General Machinery.

Lexington, Ky., parties are organizing a company to construct an electric road from that city to Paris, in the same State. It is understood that the car and repair shops are to be located at the latter city. Y. Alexander, Lexington, is interested.

The Norwalk Steel & Iron Company, Norwalk, Ohio, will erect a large machine shop.

In the United States Circuit Court, at Pittsburgh, last week, in the case of the Best Mfg. Company of Pittsburgh against the Lawrenceville Bronze Company, the Fox Copper & Bronze Company and the Republic Iron & Steel Company, alleged infringements of patents for bosh plates for furnaces in the case of the Best Mfg. Company against the Fox Copper & Bronze Company, the Court sustained the patent on the bosh plate of the plaintiff company. In the suit of the same plaintiff against the Lawrenceville Bronze Company the Court decided that the defendant did not infringe the Best Company patent and ordered the bill dismissed.

The Youngstown Foundry & Machine Company, Youngstown, Ohio, manufacturers of rolls and rolling mill machinery, recently shipped to the Bessemer plant of the Republic Iron & Steel Company, at Youngstown, Ohio, a large hydraulic pusher. It is one of the largest hydraulic machines ever turned out by this concern. The company have received a contract from the Republic Iron & Steel Company for three additional pit furnaces to be erected at their Bessemer works in Youngstown.

The Baird Machinery Company, 123-125 Water street, Pittsburgh, have been furnishing large consignments of machines, lathes and tools to the new plant of the Standard Steel Car Company, at Butler, Pa. They have also been making recent shipments to Valparaiso, Chile, to the Diamond Match Company, of large quantities of machines and machine tools, and are also sending large consignments of various tools and machines to the same firm to their works in Switzerland.

Borden & Selleck Company, Chicago, Ill., report a substantial demand for their modern coal, ashes and coke handling machinery, such as elevators, conveyors, coal crushers and scrapers. Among the orders on their books they mention the following: O. S. Richardson Coal Company, Chicago, coal elevator; McCormick Harvesting Machine Company, Chicago, coke elevator and conveyors; Peabody Coal Company, Chicago, conveyors, elevators, car unloaders, &c.; C. Reiss Coal Company, Escanaba, Mich., coal conveyors, screens, &c.; Sears, Roebuck & Co., Chicago, continuous freight elevator, package and main continuous elevator; American Smelting & Refining Company, South Chicago, Ill., special metal lifts and car pullers; Latrobe Steel & Coupler Company, Chicago, special conveyors for handling foundry sand, &c.; McCormick Harvesting Machine Company's malleable iron foundry, Chicago., special machinery for handling coke.

The Illinois Machine & Foundry Company, located at 299 West Lake street, Chicago, for the past year, have moved to their new quarters at 1121-1133 West Twenty-first street. The business of the company during the year has grown to such an extent that it was found necessary to have more room. The new shops have been fully equipped with modern machinery for the manufacture of presses, dies, special machinery, and an up to date foundry and pattern shop. W. S. Cumming is president of the company and the machinery department is in charge of W. J. Kenny.

The Pittsburgh Tool & Drop Forge Company have been organized at Pittsburgh by E. L. Maxwell, E. D. Fulton and John L. McFeeley. Application will be made for a charter.

The Leland & Falconer Mfg. Company, Detroit, Mich., have contracted for the erection of three new buildings in connection with their present plant. The cost of the improvements is estimated at $14,000. One building will be used as a pattern shop, another for finishing and shipping room, and the third for storage of pig iron and other raw material. These improvements will relieve the present plant, allowing for the installation of additional machinery and tools, thus increasing the output of the company.

Morse, Williams & Co., Philadelphia, Pa., will erect a two-story machine shop, 100 x 136 feet, on Frankford avenue.

It is understood that Robeson T. White of Salt Lake City, Utah, has secured a tract of land on Newark Bay, Bayonne, N. J., where it is proposed to erect extensive iron works.

The real estate and machinery of the Hardy Machine Company, makers of the Hardy grinder, at Biddeford, Maine, will be sold at auction September 19.

The Milwaukee division of the International Harvester Company have been authorized to purchase such new improved machinery as is required to fill the contract for machines entered into for the season of 1903. It is understood that the output of the Milwaukee division will be 50 per cent. in excess of the production of 1902, and when the factory is in full operation employment will be given to 1000 men. G. H. Schulte, formerly general manager of the Milwaukee Harvester Company, has been appointed general manager of the Milwaukee division of the International Harvester Company. An inspection has been made of the Champion, Deering, McCormick and Piano divisions of the company also, and recommendations for improvements referred to the Executive Committee.

The Steam & Electrical Equipment Company, Conestoga Building, Pittsburgh, sold last week one 200-kw. General Electric street railway generator, 550 volts, M. P., 4425 r.p.m., to the Gerstin Company of New York. They also received an order from the American Car & Foundry Company of St. Louis for a horizontal return tubular boiler, Erie make, 66 inches by 17 feet. They are having difficulty in securing apparatus to meet the demand.

The Eureka Fire Hose Company of Jersey City, N. J., have decided to adopt an alternating current system in order to reduce the cost of fire insurance where motors are used in the presence of inflammable material. This step has been taken on the advice of one of the largest insurance companies of this country. The new apparatus includes one 75-kw. belt driven alternator, furnishing two-phase current at 7200 alternations and 220 volts; also exciter, switchboard equipment, slide rails, rheostats, &c. A number of induction motors have been purchased, including the following: Five of 15 horse-power, one of 10 horse-power, five of 5 horse-power, and three of 2 horse-power. With these there will be furnished a switchboard feeder panel, completely equipped with instruments and switches. The entire electrical equipment has been ordered from the Westinghouse Electric & Mfg. Company of Pittsburgh.

Boilers, Engines, &c.

The W. K. Henderson Iron Works, Shreveport, La., are in the market for gasoline engines and dynamos.

The Stirling Company, Chicago, manufacturers of water tube safety boilers, expect to have their several new buildings at Barberton, Ohio, completed and ready for operation by January.

The Slater Cotton Company, Pawtucket, R. I., have purchased the property adjoining their new mill on Church street, upon which they will erect a power plant to supply both mills. A 1200 horse-power Filer & Stowell condensing engine and Stirling boilers will be installed. The power plant of the old mill will be abandoned and the present engine house of the new mill will be extended and will be utilized as an addition to the various departments.

The Girard Boiler & Mfg. Company, Girard, Ohio, have been awarded a contract by the West St. Louis Construction Company, St. Louis, for the erection at Kirkwood, Mo., of a steel standpipe 24 feet diameter by 110 feet high.

The Empire Steel & Iron Company, Catasauqua, Pa., have awarded the contract for their new power house at Oxford, N. J.

The Hartford Engine Works, Hartford, Conn., have purchased the special tools and patterns of the late E. H. Judd and are in a position to repair the Woodruff & Beach engine formerly built by him. They also have the patterns and special tools of the late Hartford Engineering Company, who built the Buckeye engine in New England, which they continue to build on order.

Foundries.

E. R. Caldwell & Co., Bradford, Pa., have been making important improvements in their foundry and machine shop. An addition to the foundry has just been completed. It consists of a brick building, with steel frame work, 90 x 125 feet, which is claimed to give the plant a larger capacity than any similar one between Buffalo and Pittsburgh. The new building is fitted up with the latest appliances for rapid work, including a 20-ton electric traveling crane. It is equipped with a cupola having a capacity of 12 tons an hour. A 50-horse-power Gray & Blaisdell gas engine will soon displace the steam plant now in use, but the boiler and engine will be kept in reserve for an emergency. The capacity of the machine shop has been more than doubled in the past two years. The firm build small gas engines for the Lazier Gas Engine Company of Buffalo and make oil well supplies, cast iron fittings, plumbers' cast goods, hydraulic car

wheel presses, &c. They have sales agencies in New York and Pittsburgh. The business has been established only six years.

The Lane & Bodley Company, Cincinnati, Ohio, are progressing with the construction of the addition to their manufactory for the purpose of providing room for their Corliss engine business and to answer the demands of their jobbing trade. It will be thoroughly modern in every respect and equipped with the most up to date appliances.

The Norway Iron & Steel Company, York, Pa., will increase their capacity by the erection of an additional foundry of the same size as the present one, 80 x 240 feet, and the installation of another 15-ton melting furnace. The working capital will also be increased, but the capital stock will not be doubled as was reported.

The McLeod Company, New York and Chicago, manufacturers of low pressure, standard and extra heavy flanged fittings, cast iron pipe, specials, &c., announce the completion of their new flange fitting and pipe shop at New Brighton, Staten Island. The shop is equipped with overhead travelers and power derrick and has superior shipping facilities by both rail and water. The company are also increasing the capacity of their Chicago shop.

The report that the Pittsburgh Steel Foundry are building a new plant at Braddock, near Pittsburgh, is untrue. The works of the Pittsburgh Steel Foundry are at Glassport, Pa., but it is a fact, however, that the Sterling Steel Casting Company, of which Uriah Tinker is president, are building a large steel casting plant at Braddock. The main foundry building, which is about 200 feet long and some 90 feet wide, is already under roof, the frame work being of structural steel. The foundations for the engines and converters will be completed within the next week, and the engines will be placed in a month or more. They will employ about 300 men, and expect to get in operation about the middle of December. The work has been going along much quicker than was first anticipated, as the steel manufacturers have been furnishing the structural steel promptly.

The Marcy Mfg. Company, Bluffton, Ind., are installing a new cupola in their foundry which will increase the capacity 100 per cent. They have also added to their machine shops a number of the latest improved machines to correspond with the increased foundry capacity. This places the company in a position to take care of their rapidly increasing business by filling orders promptly.

Buildings and Bridges.

The Berlin Construction Company, Berlin, Conn., who have the contract for the erection of the new plant of the Capewell Horse Nail Company of Hartford are running their works to its fullest capacity. Work on hand includes a five-story fire proof building together with several smaller buildings for the Winchester Repeating Arms Company, New Haven; new rod mill for Coe Brass Mfg. Company, Ansonia; 1000-foot bridge across the Hudson River at Greenwich; several bridges in Maryland, New Jersey and Mexico. They have recently completed a seven-story building for P. & F. Corbin, New Britain; a new plant for the Eaton, Coe & Burnham Company, Bridgeport, and steel work for a large paper mill at Haverhill, Mass.

The new plant of the West Virginia Bridge & Construction Company, under erection for some months at Glenns Run, W. Va., near Wheeling, is nearing completion and is expected to be in operation about November 1 next. The Penn Bridge Company of Beaver Falls, Pa., had the contract for the main building, which is steel, and which has been finished. The West Virginia Bridge & Construction Company will be manufacturers and constructors of buildings, bridges, tanks, structural and plate work. The officers of the concern are Edward Hazlett, president; George A. Laughlin, vice-president; G. E. Wincher, secretary and treasurer, and J. H. Barrett, general manager.

Fires.

Spontaneous combustion caused a fire September 12 which did $100,000 damage to the plant of the Hubbard Fertilizing Company, Canton, Md.

The plant of the West Virginia Boiler & Machine Works, Mannington, W. Va., was recently destroyed by fire. The loss is about $10,000.

The Lorain Foundry, Lorain, Ohio, was damaged $25,000 by fire September 9.

The Mt. Pleasant Foundry & Plow Company, Mt. Pleasant, Mich., suffered a $5000 loss by fire at their plant September 8.

The foundry of McFarlane & Co., Denver, Col., was recently damaged by fire. The loss will reach $10,000.

The Rome Stove Works, Bowie & Terhune, proprietors, Rome, Ga., were recently destroyed by fire. The loss is about $60,000.

The plant of the Bridgeton Woolen Company, Bridgeton, N. J., was recently destroyed by fire. The loss is about $100,000.

The Utica Excelsior Company, Utica, N. Y., suffered a $20,000 loss by fire at their plant recently. The main loss is on the machinery, which was all new and especially valuable, being built expressly for the company.

The shovel factory of the Union Furnace Mfg. Company, at Tyrone, Pa., was seriously damaged by fire September 16. The loss will be over $10,000.

The briquette factory of the Tesla Coal Company, Stockton, Cal., was destroyed by fire September 16. The loss amounts to over $100,000.

Hardware.

The Ohio Rake Company, Dayton, Ohio, have secured the patents, patterns and good will of the Union Corn Planter Company, Peoria, Ill. The Union Corn Planter Company were successors to John Selby & Co., one of the pioneer corn planter manufacturing concerns of the country. The Union Company have been in business for over 30 years.

The American Machine Company, Nashville, Tenn., commenced operations in November, 1901, manufacturing small light machinery, embracing automobiles and sewing machines, on estimate. Special work undertaken is that of factory machines, electric motors and house telephones, while electric supplies of all kinds are carried in stock. The company manufacture what is said to be the only automatic shade roller in which the shade is prevented from tearing loose from the roller.

Derby & Ball, Bellows Falls, Vt., manufacturers of scythe snaths, have built a new storehouse, 26 x 90 feet, two stories high, to replace the former building, which was torn down. This new building, while giving about the same space for storage as the old, improves materially the general appearance of their plant.

The Girard Hardware Company of Girard, Ohio, have been incorporated with a capital of $10,000.

Miscellaneous.

The Hampden Corundum Wheel Company, Springfield, Mass., have about completed their large factory at Brightwood to replace the one destroyed by fire in the spring, and are already producing about three-fifths of their full capacity.

Thomas Lee of Cincinnati has contracted for the erection of a new building adjoining his present factory for the manufacture of dust collectors and blow piping. The addition was made necessary by the increased volume of business. The new building will have larger floor space than the present factory and will greatly facilitate operations.

The National Musical String Company, New Brunswick, N. J., will build an addition, 25 x 60 feet, three stories, to their plant.

The Chattanooga Steel Roofing Company, Chattanooga, Tenn., are now, as they have been for some time, kept busy in their different lines. They are manufacturing largely galvanized and cast iron for store fronts. They have also a good demand for their dripping pans and Moomaw's patent tin shingles.

The General Fire Proofing Company of Youngstown, Ohio, manufacturers of the Herring-bone expanded metal lath, whose plant at Niles, Ohio, recently was destroyed by fire, will start up their new works about September 25. They have been working day and night since the fire getting machinery placed so as to be able to fill the large orders which they have on hand. The Pittsburgh Construction Company of Pittsburgh have the contract for the work, which is being executed according to plans drawn by and under the supervision of Armin Schotte, consulting engineer, of Pittsburgh.

The capital stock of Deere & Co., Moline, Ill., manufacturers of plows, has been increased from $1,500,000 to $6,000,000. The additional capital is to provide for the changes which are made necessary by the expansion of business during the past two years. All the stock has been subscribed by the present owners.

The P. P. Emory Mfg. Company, Springfield, Mass., coppersmiths, brass founders and machinists, will erect a new plant, 50 x 120 feet, in the rear of their present building. Plans of construction are not yet completed and but little additional machinery will be required.

The rod mill which the Coe Brass Mfg. Company, Ansonia, Conn., purchased some time ago is being rebuilt and put in the same excellent condition as the other departments of the company.

The plant of the Niles Mining & Mill Supply Company, at Niles, Ohio, which was recently destroyed by fire, will be rebuilt on a somewhat larger scale.

It is stated that John W. Gates and Henry E. Weaver, head of the Weaver Coal & Coke Company, Chicago, have leased the Leiter Coke Oven Company near that city and have secured control of the interest of the Leiters in Franklin County, Ill., where they recently purchased large tracts of land and projected the Chicago, Zeigler & Gulf Railroad. It is thought that the properties bought are intended for the Illinois Steel Company.

American Tin Mills for Italy.—The Gruson Iron Works of Eddystone, Pa., through their representatives, F. R. Phillips & Sons Company of Philadelphia, Pa., have been awarded a contract for a tin plate plant to be erected in Italy. The plant will consist of three hot and four cold mills and all other equipments in American modern mills. F. R. Phillips & Sons Company also have the contract for the tin machinery in connection with the above. This is the first American contract for tin mills to go abroad.

The Iron and Metal Trades.

The strain of unsatisfactory deliveries of raw material has been growing, being particularly severe in Coke both for furnace and foundry use. The result has been that relief has been sought by additional importations on a very considerable scale. In Foundry Pig Iron the tidewater markets are dependent almost entirely on Scotch, English, German and Canadian Iron for prompt and early deliveries, and even in Chicago round lots are reported to have been sold during the past week.

For future delivery, in 1903, consumers are, however, purchasing only home Irons, among the recent purchases being one of upward of 10,000 tons by the largest melter of Iron in the metropolitan district. Foreign Iron is called for for distant delivery, only in exceptional cases.

An interesting development has been the buying of Bessemer Pig for the Central West, two lots of West Coast Hematite, each of 10,000 tons, having been taken at about $21.50, Pittsburgh, with further business under negotiation. It is believed in the trade that leading interests in the Steel trade are short of metal and may be forced to import.

The foreign Steel market has been active. Among the sales effected is one lot of about 10,000 tons for a Wire mill in Indiana, on the basis of 72 shillings, Antwerp, done about ten days since, and a 10,000-ton lot for a large interest in the Central West for shipment beginning in November. Negotiations for further lots are proceeding.

The majority of importers state that the market has decidedly hardened and that 75 to 76 shillings 6 pence, Antwerp, is now as low as can be done. The German sellers follow the policy of withdrawing as soon as they have a certain amount of tonnage assured, but are quick to re-enter the market when orders do not flow in at the higher asking price. The result is that the market shows rapid changes from softness in spots to hardness and a rising tendency.

Practically all the business in foreign Steel is for early delivery. It is understood that the leading domestic producing interest has orders booked for Bessemer Billets and for Sheet Bars which will require full work until February, 1903.

One feature which applies to all the heavy articles in the foreign trade is the upward tendency in freights, both to Atlantic and Gulf ports. They have already risen and may advance further temporarily, it being believed, however, that they will recede when the cotton and grain export movement sets in heavily. As it is, delivered prices of Pig Iron and of Steel reflect the advance both in the price of the material at foreign mill and of the advance in freights.

Reports from the domestic markets reflect a continuance of the heavy consumption in all the heavy lines. Orders for Rails, Plates, Structural Material, &c., are coming in steadily. In these branches the full capacity of the United States Steel Corporation is engaged to the middle of next year. The total tonnage of all products on the books is reported to be about 4,725,000 gross tons.

A Comparison of Prices.

Advances Over the Previous Month in Heavy Type, Declines in Italics.

At date, one month and one year previous.

	Sep.17, 1902.	Sep.10, 1902.	Aug. 20, 1902.	Sep. 18. 1901.
PIG IRON:				
Foundry Pig No. 2, Standard, Philadelphia	*$22.00	*$22.00	*22.00	$14.75
Foundry Pig, No. 2, Southern, Cincinnati	***21.75**	*21.75	*20.00	13.00
Foundry Pig No. 2, Local, Chicago	***23.00**	*23.00	22.00	15.00
Bessemer Pig, Pittsburgh	*21.75	*21.75	21.50	15.75
Gray Forge, Pittsburgh	20.75	*21.25	20.75	13.50
Lake Superior Charcoal, Chicago	*26.00	*26.00	26.00	17.00
BILLETS, RAILS, ETC.:				
Steel Billets, Pittsburgh	†29.00	†29.00	31.00	24.50
Steel Billets, Philadelphia	†26.50	†27.00	28.50	27.00
Steel Billets, Chicago	†30.00	†30.00	31.00	....
Wire Rods, Pittsburgh	36.00	36.00	36.00	36.00
Steel Rails, Heavy, Eastern Mill	28.00	28.00	28.00	28.00
OLD MATERIAL:				
O. Steel Rails, Chicago	**19.00**	18.50	18.50	13.50
O. Steel Rails, Philadelphia	21.50	21.50	21.50	16.75
O. Iron Rails, Chicago	**25.00**	25.00	24.50	21.00
O. Iron Rails, Philadelphia	24.00	24.00	24.00	18.50
O. Car Wheels, Chicago	21.00	21.00	21.00	16.00
O. Car Wheels, Philadelphia	20.00	20.00	20.00	16.50
Heavy Steel Scrap, Chicago	**18.50**	18.50	18.00	12.50
FINISHED IRON AND STEEL:				
Refined Iron Bars, Philadelphia	1.92	1.92	1.92	1.60
Common Iron Bars, Chicago	**1.90**	1.90	1.80	1.60
Common Iron Bars, Pittsburgh	1.80	1.80	1.80	1.50
Steel Bars, Tidewater	2.00	2.00	2.00	1.60
Steel Bars, Pittsburgh	1.60	1.60	1.60	1.50
Tank Plates, Tidewater	2.00	2.00	2.00	1.75
Tank Plates, Pittsburgh	1.75	1.75	1.75	1.60
Beams, Tidewater	Nom.	Nom.	2.25	1.75
Beams, Pittsburgh	Nom.	Nom.	2.00	1.60
Angles, Tidewater	Nom.	Nom.	2.35	1.75
Angles, Pittsburgh	Nom.	Nom.	2.00	1.60
Skelp, Grooved Iron, Pittsburgh	2.02½	2.10	2.15	2.00
Skelp, Sheared Iron, Pittsburgh	2.10	2.15	...	2.05
Sheets, No. 27, Pittsburgh	2.85	2.85	2.90	3.65
Barb Wire, f.o.b. Pittsburgh	2.90	2.90	2.90	2.90
Wire Nails, f.o.b. Pittsburgh	2.05	2.05	2.05	2.30
Cut Nails, Mill	2.05	2.05	2.05	2.05
METALS:				
Copper, New York	**11.70**	11.80	11.50	16.50
Spelter, St. Louis	5.15	5.15	5.20	3.90
Lead, New York	4.10	4.10	4.10	4.37½
Lead, St. Louis	3.97½	3.97½	3.97½	4.25
Tin, New York	26.35	27.00	28.30	25.20
Antimony, Hallett, New York	8.00	8.00	8.00	8.50
Nickel, New York	40.00	40.00	40.00	60.00
Tin Plate, Domestic, Bessemer, 100 lbs., New York	4.19	4.19	4.19	4.19

* For 1903. † Foreign.

Chicago.

FISHER BUILDING, September 17, 1902.—*(By Telegraph.)*

Conspicuous among the developments of the week has been the less arbitrary character of the Pig Iron market. The offering of foreign Metal has at least given buyers more assurance, and has assisted in producing conditions slightly more favorable to consumers, some large melters being able to take advantage of these facts, but, on the other hand, there has been a steadying influence imparting some degree of harmony between prices for the current year and those prevailing for the first half of 1903. This adjustment means little higher prices for next year, but little lower prices for early delivery. The unsettled Coke market has resulted in even higher prices being paid for spot material and lower prices for stocks to arrive, while contracts for the entire year have been made on a higher level based on prices at the ovens; the outlook for both furnaces and foundries is still very serious. The Bar Iron mills which are endeavoring to maintain the 1.95c. basis, Chicago, are still somewhat hampered by sales of outside mills and of dealers at concessions from their minimum. Soft Steel Bars of large sizes are very difficult to obtain and will command a premium. Smaller sizes of Bars, however, are in more ample supply and rather slow. The Structural Material market is conspicuous because of the urgent demand for a year's supply by small bridge works, which even the largest mills find difficulty in taking care of. Plates continue to strengthen, and even Light Sheets are meeting with some improvement. One of the most unsatisfactory departments is that of Merchant Pipe, the active competition resulting in much lower discounts ruling for mill shipments. On the other hand, Merchant Steel is conspicuous for strength and activity, car-

riage and agricultural implement manufacturers being forced into the market for larger supplies. Tool Steel also is selling more readily, with some liberal contracts being placed. It has now been definitely determined that a Crucible Steel mill will be constructed in this section of the West soon, but details are withheld for the present. The demand for Rails continues as active as ever, both for Light and Standard Sections. The Denver & Eastern is supposed to have placed an important contract at the Colorado works, but nothing definite can be learned in this market. Much lower prices are reported current for foreign Billets at Pittsburgh, but there is scarcely enough doing in this market to establish quotations; domestic Billets are held firmly. Old Material continues to steadily strengthen. A feature of interest is the sale of larger quantities of Cast Pipe both to municipalities and to private companies, with four or five contracts pending at various points, which will probably be closed during the next ten days.

Pig Iron.—The edge of the Pig Iron market is less keen, and the arrival of foreign metal with larger offerings both for present and future deliveries has had a sobering and also a steadying effect upon the market for the domestic production. One of the most marked effects has been the narrower range caused between Iron for this and for next year's deliveries. Then, too, there has been a more ample supply of domestic Iron available, which, with the less urgent demand from consumers, has assisted the tendency above referred to. Iron from Tennessee and Virginia has occupied with foreign Iron the most prominent position in the market, four of the local stacks being banked for lack of Coke and very little Iron being available in the Birmingham district, but during the past few days there has been evidence that even furnaces in the Alabama district will have some Iron to spare for the last quarter of the year, and speculative interests have shown more disposition to market their holdings. The result of these conditions has been the sale of an increased tonnage of both domestic and foreign Iron for deliveries extending from January to June, 1903, and also more liberal sales for immediate delivery. Sales for the week have aggregated about 15,000 tons, which, although small, show a material increase over the transactions for several weeks. One of the significant features of the transactions in foreign metals has been the wide range at which the lower grades have sold. Pipe works and local Gray Iron foundries are reported to have purchased 5000 tons of No. 3 Foundry Iron, foreign inspection, $22, duty paid, f.o.b. Chicago, but there also have been sales of the same grade as high as $24, while No. 2 has sold at $24.50 to $25, and No. 1 is held at $25.50 to $26, f.o.b. Chicago, duty paid. Another of the more prominent sales of the week has been a lot for 2500 tons of Standard Bessemer at about $25 for delivery during the last quarter of this year, and one lot each of 500 and 300 tons at $26 for prompt delivery. The sales of Virginia and Tennessee Iron have been also entirely of Foundry grades, ranging in lots of from 100 to 600 tons for deliveries extending from January to June of next year on the basis of $20.50 for No. 1 and $20 for No. 2, Birmingham. Sales for immediate delivery ranging from carload lots to lots of 200 tons have been made at $27.65 for No. 1, $27.50 for No. 2; 100 tons of No. 1 Soft was also sold for $23 at the furnace, equivalent to $21.75, Chicago. Silvery Iron has been sold at $29.15 to $32.15 for 4 to 8 per cent. Silicon for prompt delivery. The depleted Coke supply is still a factor of the utmost importance, holding furnaces and foundries in thraldom. Some interesting facts concerning prices of Coke will be found elsewhere. The approximate prices current for delivery during the first half of next year are as follows:

Lake Superior Charcoal	$26.00 to $27.00
Local Coke Foundry, No. 1	23.50 to 24.00
Local Coke Foundry, No. 2	23.00 to 23.50
Local Coke Foundry, No. 3	22.50 to 23.00
Local Scotch, No. 1	24.00 to 24.50
Ohio Strong Softeners, No. 1	25.50 to 26.50
Southern Silvery, according to Silicon.	23.10 to 23.50
Southern Coke, No. 1	24.15 to 24.65
Southern Coke, No. 2	23.65 to 24.15
Sotuhern Coke, No. 3	23.15 to 23.65
Southern Coke, No. 1 Soft	24.15 to 24.65
Southern Coke, No. 2 Soft	23.65 to 24.15
Foundry Forge	22.15 to 22.65
Southern Gray Forge	21.65 to 22.15
Southern Mottled	21.65 to 22.15
Southern Charcoal Softeners, according to Silicon	27.15 to 27.65
Alabama and Georgia Car Wheel	27.00 to 27.50
Malleable Bessemer	24.00 to 25.00
Standard Bessemer	25.00 to 26.00
Jackson County and Kentucky Silvery, 6 to 8 per cent. Silicon	27.60 to 28.60

Bars.—The character of the market for Bar Iron has been but little changed during the week, there being some irregularity not warranted by the present prices of Scrap and Pig Iron; but new business is only moderate in amount and mills find difficulty in inducing buyers to specify on old contracts. The market is quoted on the basis of 1.95c., Chicago, with concession as previously noted on desirable specifications. Soft Steel Bars remain firm, with a fair degree of activity as far as new business is concerned and fair specifying on old contracts. The following are the prices current: Soft Steel Bars, 1.75c. to 1.90c.; Hoops, 2.10c. to 2.25c.; Angles, 1.85c. to 1.95c., base, mill shipments. The demand for Bars and Angles continues quite active, but there is but little, if any, improvement in the demand for Hoops. Prices are as follows: Bar Iron, 2.25c.; Soft Steel Bars, 2c. to 2.25c.; Angles, 2.50c., and Hoops, 2.50c., from store.

Structural Material.—There is an active demand for all kinds of Structural Material and the volume is restricted only by the inability of the mills to contract for the quantities and deliveries demanded by buyers. The sales of the week will probably be covered by 4000 tons, made up of small quantities for next year's delivery. The demand from small bridge works is especially active, if not importunate. There continues to be some inquiry for foreign Steel, but few contracts result in this section. Domestic Steel, mill shipment, sold at the following prices: Beams, Channels and Zees, 15 inches and under, 1.75c. to 1.90c.; 18 inches and over, 1.85c. to 2c.; Angles, 1.75c. to 1.90c. rates; Tees, 1.80c. to 1.90c.; Universal Plates, 1.75c. to 1.85c. There is little, if any, decrease in demand for quick delivery from local stocks and the following prices are current: Beams and Channels are wanted at 2.50c. to 3.50c.; Angles, 2.50c. to 3.50c.; Tees, 2.55c. to 3.50c. at local yards, but premiums are frequently paid for special sizes.

Plates.—There is an active demand for large Plates, especially for sizes ranging from 48 inches upward, but there is said to be some surplus of 42-inch sizes, which are meeting with a fair sale in lieu of the larger sizes which are unattainable. The following are the prices current: Tank Steel, ¼-inch and heavier, 1.75c. to 2.25c.; Flange, 1.85c. to 2.35c.; Marine, 1.95c. to 2.50c. The demand from store continues on a liberal scale and the market is strong in tone at the following prices: Tank Steel, ¼-inch and heavier, 2.30c. to 2.50c.; Tank Steel, No. 8, 2.45c. to 2.55c.; Flange, 2.50c. to 2.75c., all f.o.b. warehouse, Chicago.

Sheets.—Manufacturers report an active movement, with prices well sustained for all kinds. The jobbing demand is improving, but offerings are liberal and prices are steady as previously quoted, as follows: No. 27 Black Sheets sell at 3.15c., mill shipment; small lots from store are offered at 3.25c. to 3.35c., Chicago. Mill shipments of Galvanized Sheets are held at 4.05c. to 4.25c., net, while small lots from store are selling at 4.30c. to 4.40c. for No. 27.

Cast Pipe.—There continues to be an active demand, there being a number of important municipal contracts pending which will probably be closed during the current week. Sales have aggregated about 1000 tons per day during the month of August and the same percentage has been kept up thus far during the month of September. Among the contracts placed this week was 6000 tons of 4's, 6's, 8's, 12's, 20's and 36's by the city of Los Angeles, Cal. There were also sales of 1000 tons of 16's, 600 tons of 20's and various smaller amounts of smaller sizes sold to private corporations. Manufacturers continue to sell small lots at the following prices: 4-inch, $35.75 to $36; 6-inch, $33.75 to $34; 8-inch and upward, $33. Gas Pipe, $1 per ton higher than Water, f.o.b. Chicago.

Merchant Pipe.—The market is somewhat unsettled, there being only a moderate degree of activity and lower prices resulting from active competition for mill shipment. The following are the prices current, random lengths, Chicago: Black, ⅛ to ½ inch, 56½ off; ¾ to 12 inches, 63½ off; Galvanized, ⅛ to ½ inch, 43½ off; ¾ to 12 inches, 50½ off.

Boiler Tubes.—There has been a fair volume of business, but without any special feature of interest, and prices have remained steady for mill shipments as follows:

	Steel.	Iron.
1 to 1½ inches	42½	39
1¾ to 2½ inches	55½	38
2¾ to 5 inches	61	48
6 inches and larger	55½	38

There has been a fair trade experienced for shipment from store and the market has continued firm at the following prices:

1 to 1½ inches	35	35
1¾ to 2½ inches	47½	32½
2¾ to 5 inches	55	42½
6 inches and larger	47½	..

Merchant Steel.—A very strong tone has continued to prevail, with a liberal movement on previous contracts and a fair volume of new business. Several lots of 100 tons each have been sold during the week to carriage and agricultural implement manufacturers. The little Steel available from store sells readily and the market remains firm. For mill shipment prices are as follows: Smooth Finished Machinery Steel, 2c. to 2.10c.; Smooth Finished Tire, 1.95c. to 2.10c.; Open Hearth Spring Steel, 2.65c. to 2.75c.; Toe Calk, 2.25c. to 2.40c.; Sleigh Shoe, 1.85c. to 1.90c.; Cutter Shoe, 2.40c. to 2.60c.; Cold Rolled Shafting, 50 off in carload lots. Ordinary grades of Crucible Tool Steel are quoted at 6½c. to 7c. for mill shipment; specials, 12c. upward.

Rails and Track Supplies.—There have been sales aggregating about 15,000 tons in lots of 2500 and 5000 tons

each for Standard domestic Rails for delivery during the first three-quarters of next year, about half the tonnage going to Eastern mills. There is also a rumor that 50,000 tons have been sold to the Denver & Eastern Railroad for next year, but this was not verified. The Monon placed an order for 5000 tons. There is also a good demand for moderate amounts from electric roads and a fair order demand for Light Rails, with full prices readily obtainable. Official prices remain $28 for Standard and $27 for second quality, at the mill. Light Rails are quoted at $32 to $45, according to weight and time of delivery. Track Supplies of all kinds are very active. The Illinois Central Railroad is reported to have placed an order for all Track Bolts needed for next year with a Cleveland mill and one order was placed for 12,000 Nut Locks. The following are the prices current: Splice Bars or Angle Bars, 2c.; Spikes, 2.50c.; Track Bolts, with Hexagon Nuts, 3.10c. to 3.45c.; Square Nuts, 2.95c. to 3.10c.

Billets.—The local market is slow, but the offerings are light and prices are well sustained for Basic Open Hearth domestic Billets, which are quoted at $36 to $37 in 1000-ton lots, while small lots have been sold at $38 to $40, according to buyer, analysis and time of delivery. There is little call for foreign Billets and prices in this section are little better than nominal, ranging from $30 to $30.50, Chicago delivery. Some sales are reported here made in the East at lower prices than those current a week or ten days ago.

Old Material.—The temper of the market has lost nothing during the week. In fact, in some instances mills have been obliged to pay even higher prices, especially for Old Steel Rails, mixed lengths, No. 2 Railroad Wrought and Iron Axle Turnings. The offerings are only moderate, with not much prospect of increase in supply in the near future. The following are the prices current per gross ton:

Old Iron Rails	$25.00 to $25.50
Old Steel Rails, mixed lengths	19.00 to 19.25
Old Steel Rails, long lengths	23.50 to 24.50
Heavy Relaying Rails	30.50 to 31.50
Old Car Wheels	21.00 to 22.00
Heavy Melting Steel Scrap	18.50 to 19.00
Mixed Steel	15.50 to 16.00

The following quotations are per net ton:

Iron Fish Plates	$22.50 to $22.75
Iron Car Axles	25.00 to 26.00
Steel Car Axles	23.50 to 24.00
No. 1 Railroad Wrought	21.50 to 22.00
No. 2 Railroad Wrought	.... to 19.00
Shafting	20.00 to 21.00
No. 1 Dealers' Forge	17.50 to 18.00
No. 1 Busheling and Wrought Pipe	15.00 to 15.50
Iron Axle Turnings	15.00 to 15.50
Soft Steel Axle Turnings	14.50 to 14.75
Machine Shop Turnings	14.25 to 14.75
Cast Borings	10.25 to 10.75
Mixed Borings, &c	10.50 to 11.50
No. 1 Boilers, cut	14.50 to 15.00
Heavy Cast Scrap	17.00 to 17.50
Stove Plate and Light Cast Scrap	12.50 to 13.00
Railroad Malleable	16.25 to 16.75
Agricultural Malleable	15.00 to 15.50

Metals.—While the Copper market has sustained the advance of a week ago there has been but little activity. Lake is steady at 12¼c. to 12½c. in car lots and 12½c. to 12¾c. in a jobbing way. Pig Lead has continued active and firm at 4.05c. for 50-ton lots and 4.07½c. in carload lots. Sheet Zinc has continued to meet with a good demand and the market has continued firm at 6½c. in carload lots and 6.65c. in lots of 600 lbs. Old metals meet a fair demand, with higher prices asked and obtained for Lead Pipe and Zinc. Copper and Brass have remained firm without change. The following are the prices current: Heavy Cut Copper, 10¾c.; Red Brass, 10½c.; Copper Bottoms, 9½c.; Lead Pipe, 3.90c.; Zinc, 3.75c.

Coke.—The market has been very irregular, with sales of Foundry grades at $12 to $15, spot, track, but sales have been made to arrive at $8 to $9, while contracts for a year have been made at $6, delivered Chicago, which is on the basis of $3.75 at the ovens. Other contracts have also been made by local foundries on the basis of $3.50 at the ovens. Reports from Connellsville are that manufacturers and railroad companies have reached an agreement by which Coke is to be given right of way and pushed forward to the Steel industries in the West. The more encouraging reports from Virginia and West Virginia thus far have had little more than a moral influence and probably will not affect the market materially until next month.

The Republic Iron & Steel Company, Chicago, have opened a new office at Pittsburgh in the Frick Building. Floyd K. Smith and George L. Claypool will be in charge. Mr. Smith was at one time connected with the Lorain Steel Company and later with the Sharon Iron Company and Buhl Steel Company. Mr. Claypool has been in the employ of the Republic Iron & Steel Company for some time at Cleveland.

Philadelphia.

FORREST BUILDING, September 16, 1902.

The reports of the Iron and Steel trades must again be a virtual repetition of last week's article. No new features have been presented, but those of last week, as regards foreign material, have been more strongly emphasized. The local trade is now completely dominated by English, Scotch and Canadian Pig Iron, although Germany has made a beginning and France has commenced knocking at the door. There is also a strong probability that before the stringency is abated Russia will have made initial shipments to this country. It is an extraordinary reversal of conditions from those which prevailed during the closing year of the last century (1899). At that time it appeared to be a foregone conclusion that the world's markets were ours, but three years later it appears that the world that was, and some portions of the world which were too insignificant to be seriously considered, are dumping their products on our coasts by the scores of thousands of tons per month. This may be designated as a kind of "grotesque iron-y," yet the fact is as undeniable as it is surprising. Some may have in a measure foreseen the beginning of our export trade in Iron and Steel, but the man who predicted such a tremendous reversal of it inside of three years has yet to be heard from. The one fact, however, which admits of no dispute is, that foreign Iron is being used in 90 per cent. of the foundries hereabouts, and that the same percentage holds good as regards Steel in its various forms, and that deliveries are quicker and prices lower than can be done from mills and furnaces in our own country. How long this will continue it is impossible to say, but the fuel and transportation situation is so serious that prospects of a return to normal conditions are extremely indefinite, and until there is something of that kind the entire market will necessarily remain in a condition of uncertainty. As regards business during the week it may be said that the larger proportion of it has been in English, Scotch, Canadian and German products, mostly foundry grades, but some Malleable Iron and some Low Phosphorus has been taken. French Pig Iron is also offered at prices which appear to be attractive, and some business is in a fair way of being put through in course of a few days. It is not known that Russian Iron has been offered here as yet, but from the fact that it is being successfully marketed in Great Britain makes it quite likely that it will reach the United States if the scarcity of American Iron continues much longer. Billets and Slabs are being purchased in large quantities, Canada, Germany and Scotland being the main sources of supply. Structural Shapes continue to arrive, two or three mills in Belgium and France having sold their entire output for the remainder of the year for shipment to the United States. There is no distinct change in the demand or in the prices of Finished Material, mills being well employed and the general outlook extremely satisfactory.

Pig Iron.—As already noted, foreign Iron makes the market at the present time. The supply is sufficient for present requirements, but there is no great surplus and no pressure to make forward sales. The arrivals which are almost daily are taken from the vessels direct to the consumers' yards, and lots afloat are mostly sold before the vessels are reported. The business on both sides is handled with considerable caution, although with little or no Iron in stock it seems impossible that any sudden break in prices can occur. American Irons are scarcer than ever, but consumers have made up their minds that there is no possible chance for immediate relief, and no probable chance of it for months to come, so that they are doing the best they can with what they can get. Small lots of No. 2 American Iron bring about $23.50, sometimes a little more, sometimes a little less, all depends on circumstances. Engagements for next year's business are not important at the present time. Buyers are less afraid of being shut out than they were some time ago, the supply of foreign Iron having convinced them that Iron can always be had at a price, and although it may not be precisely the kind they would like to have it is better than having none at all. Makers are already pretty well sold ahead, and they are not disturbed that buyers are less keen to place orders than they were some time ago, hence while there is a good deal of uncertainty in regard to the future to-day's prices are regarded as perfectly safe for temporary purposes. As already noted, sales during the week have not been in very large volume, neither have prices developed anything likely to indicate material change in the near future. The requirements of consumers are fairly well supplemented by foreign Iron, domestic coming forward as well as ought to be expected, all things considered. The product of the furnaces, however, is a long way below the usual standard of quality, owing to the inferiority of much of the fuel that is being used, so that while good foundry Irons are specially sought after, the supply of off grades is somewhat excessive, and in ordinary times they would be practically unsalable. Still at around $19 to $19.50 mottled and white Iron finds takers for good sized lots, although the demand is erratic, and such Irons are taken more as a matter of necessity than from choice. As regards next

year's business prices for the first half remain at about $22.50 for No. 2 X Foundry, and about 50c. less for deliveries covering the entire year. Foreign Iron from alongside ship sells at $20.50 to $21 for Middlesbro, and a 500-ton lot of German Foundry Iron was sold at $20.60. Additional lots of both French and German are offered at $21, but it is not unlikely that a little better could be done on the right kind of bid for good sized lots. Scotch brands and Malleable Iron sell at from $22 to $22.50. It should be kept in mind that these prices are on dock, deliveries in buyers' yards would cost anywhere from 60c. to $1 or $1.50 per ton additional. The following quotations represent prompt deliveries in buyers' yards for foreign Irons and next year's deliveries for American products, this year's output being practically all under contract: Cargo lots, c.i.f., at about $19 for Middlesbro No. 3; small lots, $20 to $20.50 alongside, or delivered in buyers' yards $21 to $21.50. Scotch Iron ranges from $22.50 to $23.50, and American at about the same figures as quoted in our last, for city or nearby deliveries during the first half of next year, and $1 to $1.50 more for this year's deliveries.

No. 1 X Foundry		$23.50 to $24.50
No. 2 X Foundry		22.00 to 22.50
No. 2 Plain		21.00 to 22.00
Standard Gray Forge		19.50 to 20.50
Basic		20.50 to 21.00
Low Phosphorus	Prompt shipments or spot.	23.00 to 23.50
No. 3 Middlesbro		21.00 to 21.50
Scotch Irons		23.00 to 24.00

Billets.—Business is almost exclusively confined to foreign material, quotations ranging from $26.50 to $27 on dock, duty paid, for Ordinary Bessemer, and $28 to $28.50 for Sheet Bars; Open Hearth ranges from $28 to $33, according to Carbon.

Plates.—The demand has been very active during the past few days, and some good business has been accepted and some turned down or postponed. Bridge work, tank work and car and locomotive work is absorbing a very large tonnage, and at current quotations mills have about all the business they can take care of during the remainder of the year. A considerable tonnage has been offered for next year's delivery, but manufacturers are not inclined to load up to any extent with the outlook as it is at the present time. Prices are strong, with an upward tendency, although for the time there is no quotable change from last week—viz.: Small lots, 2.10c. to 2.15c.; carload lots, ¼-inch and thicker, 2c. to 2.05c.; Universals, 2c. to 2.05c.; Flange, 2.10c. to 2.20c.; Fire Box, 2.25c. to 2.30c.; Marine, 2.30c. to 2.35c.; Charcoal Plates, C. H. No. 1, 2½c.; C. H. No. 1 Flange, 3c.; C. H. No. 1 Flange Fire Box, 3½c.

Structural Material.—There is no change of any importance. Deliveries for mill specifications are hard to place for early delivery and command all the way from 2.35c. to 2.50c. Store lots can be had of most of the leading sizes at something less than the above figures, and for direct importations of large lots 2.10c. to 2.15c. could be done for deliveries on dock, duty paid. The official figures based on Pittsburgh quotations are 1.72c. to 1.80c., but these are merely nominal and for deliveries at some period in the indefinite future.

Bars.—There is a good demand for Bar Iron, and prices are steady at 1.92c. to 2c. for coarload lots as a minimum quantity. Steel Bars are very uncertain at anything less than 2c., but Pittsburgh quotes 1.75c. to 1.80c. for deliveries in this territory, although they make no promise for deliveries at any fixed date during the current year.

Sheets.—There is a pretty fair demand, and a considerable volume of business could be had if manufacturers would shade prices a little. This is sometimes done on first-class business, but ordinarily quotations are about as follows for ordinary sized lots of Best Sheets (Common one-tenth to two-tenths less): Nos. 10 and 12, 2.30c. to 2.40c.; No. 14, 2.50c.; Nos. 16 and 17, 2.70c.; Nos. 18-21, 3c.; Nos. 26, 27, 3.10c.; No. 28, 3.30c.

Old Material.—The demand is about half and half. Some articles sell promptly at quoted rates, others are dull and neglected. The offerings are not large, however, and holders ask full prices, the following being a fair average for lots delivered in buyer's yards:

Old Steel Rails	$21.50 to $22.00
Heavy Steel Scrap	20.50 to 21.00
Low Phosphorus Scrap	27.50 to 29.00
Old Steel Axles	26.00 to 27.00
Old Iron rails	24.00 to 25.00
Old Iron Axles	29.00 to 30.00
Old Car Wheels	20.00 to 21.00
Choice Scrap, R. R. No. 1 Wrought	24.00 to 25.00
Country Scrap	20.00 to 21.00
Machinery Cast	19.00 to 20.00
No. 2 Light Scrap	17.00 to 18.00
No. 2 Light Scrap (Ordinary)	15.00 to 16.00
Wrought Turnings	16.00 to 17.00
Wrought Turnings, Choice Heavy	18.00 to 18.50
Cast Borings	10.00 to 10.50

The Dimmick interests notify the trade that they have acquired possession of the Williamson Furnace in Birmingham, Ala., which will be put in blast on Foundry Grades by the middle of October.

St. Louis.

CHEMICAL BUILDING, September 17, 1902.—(*By Telegraph.*)

Pig Iron.—A light run of inquiry and demand are reported in this market, and although it is undoubtedly the case that a number of the smaller consumers want Iron, the conditions of short supply and high prices governing the market compel them to tide over in any way that they can. The supply of spot Iron coming to this point is extremely light. Among the few sales the past week was a small one of Southern Car Wheel Iron, which brought $29.75, St. Louis. The advance in freight rate is now in force, making the rate to St. Louis $3.75. The following is the range of prices current for cash, f.o.b. St. Louis:

Southern, No. 1 Foundry	$22.00 to $24.50
Southern, No. 2 Foundry	21.25 to 23.75
Southern, No. 3 Foundry	20.75 to 23.25
Southern, No. 4 Foundry	20.25 to 22.75
No. 1 Soft	21.75 to 24.25
No. 2 Soft	21.25 to 23.75
Gray Forge	20.25 to 22.25
Southern Car Wheel Iron	20.25 to 22.75
Malleable Bessemer	.... to ....
Ohio Silvery, 8 per cent. Silicon	.... to ....
Ohio Strong Softeners, No. 1	.... to ....
Ohio Strong Softeners, No. 2	.... to ....

Bars.—Trade among the jobbers continues in very good volume for Iron and Steel Bars, and inquiry from outside sources shows improvement. We quote from the mills: Iron Bars at 1.90c. to 1.95c., and Steel Bars at 1.90c. to 2c. Jobbers quote Iron Bars at 2.25c., and Steel Bars at 2.25c.

Rails and Track Supplies.—It is the same old story of heavy demand and inquiry in this department, and there is really no important change to be noted. We quote as follows: Splice Bars at 2.10c. to 2.15c.; Bolts, Square Nuts, 3c. to 3.10c.; Hexagon Nuts, 3.25c. to 3.30c.; Spikes, 2.50c. to 2.60c.

Angles and Channels.—The jobbing trade are having a very well balanced volume of demand and inquiry for Angles and Channels and in the matter of prices no change comes to our notice. For material of this class 2.50c., base, is the quotation.

Pig Lead.—The Pig Lead market continues its quiet course, and no new important features are apparent at this time. Prices continue on the old basis, Chemical at 4c., and Desilverized at 4.05c.

Spelter.—In this department of the market a better feeling exists, and demand and prices show an advancing tendency. The quoted price at this time is 5.25c.

Cincinnati.

FIFTH AND MAIN STS., September 17, 1902.—(*By Telegraph.*)

Neither Pig Iron values nor general conditions have varied enough in the last seven days to call forth any special remark. But little Iron is being sold, for the reason that but little Iron is being offered, and buyers are showing but little interest in quotations, except where driven to forage for an occasional car to piece out some requisition. It is understood that spot Iron, while no cheaper in price, is nevertheless being offered in quantities calculated to suit very moderate wants. Virginia Iron is quotable for spot delivery on a basis about equivalent to $22.50 for No. 2 Foundry, Birmingham, which would make $25.75, f.o.b. Cincinnati. At this figure agents say they have Iron to sell, and while some other authorities regard this as rather too high a basis to be applied to Southern Iron, yet as a matter of fact no other Iron is being actually sold at a less figure. There is a promise that some Southern interests will be in the market after October 1 for Iron for both prompt and forward delivery, but in what amount the agents cannot yet tell. Forge Irons are still considerably weaker than the rest of the list, and while buyers are indisposed to offer more than $15.25, Birmingham, for these grades sellers, in part at least, have come down to the basis of $15.75, at which it is said quite a little lot, amounting perhaps to several thousand tons altogether, can be purchased. The total amount of Mill Irons which are thus being offered, and which appear to be accumulating in the furnace yards, does not appear to amount to very much when taken in comparison with the seasonable demand for such Iron. Nevertheless, some furnaces appear to be anxious to dispose of even the small surpluses they have in this line at a sacrifice to the usual proportionate price. Foreign Iron has invaded this territory to a very limited extent, and it is not thought likely that much of it will be handled in the Cincinnati market. Reports of trouble still keep coming from the furnaces, and complaints are plenty from buyers regarding the non-shipment of Iron on old orders. The Coke situation is strained to the last degree. We get a quotation to-day of $6.50 to $7, f.o.b. Cincinnati, for prompt delivery and a price of $5.60 for the same for 1903 delivery. Freight rate from the Hanging Rock district is $1.10, and from Birmingham to

Ohio River points $3.25. We quote, f.o.b. Cincinnati, for 1902 delivery, as follows:

Southern Coke, No. 1	....	to $26.25
Southern Coke, No. 2	....	to 25.75
Southern Coke, No. 3	$23.50	to 24.50
Southern Coke, No. 4	21.25	to 22.00
Southern Coke, No. 1 Soft	....	to 26.25
Southern Coke, No. 2 Soft	....	to 25.75
Southern Coke, Gray Forge	20.25	to 20.75
Southern Coke, Mottled	20.25	to 20.75
Ohio Silvery, No. 1	29.10	to 29.60
Ohio Silvery, No. 2	....	to ....
Lake Superior Coke, No. 1	26.10	to 26.60
Lake Superior Coke, No. 2	25.60	to 26.10
Lake Superior Coke, No. 3	25.10	to 25.60

Car Wheel and Malleable Irons.

Standard Southern Car Wheel, chilling grades	$26.75 to $27.75
Lake Superior Car Wheel and Malleable	25.00 to 26.25

Quotations for first six months of 1903, f.o.b. Cincinnati, the buyer to assume freight difference which may exist at time of shipment, are as follows:

Southern Coke, No. 1	$22.25 to $22.75
Southern Coke, No. 2	21.75 to 22.25
Southern Coke, No. 3	21.25 to 21.75
Southern Coke, No. 4	20.75 to 21.25
Southern Coke, Gray Forge	20.75 to 21.25
Southern Coke, Mottled	20.75 to 21.25
Southern Coke, No. 1 Soft	22.25 to 22.75
Southern Coke, No. 2 Soft	21.75 to 22.25
Lake Superior Coke, No. 1	24.10 to 24.60
Lake Superior Coke, No. 2	23.60 to 24.10

Old Material.—The market is practically unchanged from the basis of a week ago. We quote dealers' buying prices, f.o.b. Cincinnati, as follows: No. 1 Wrought Railroad Scrap, $21 to $21.50 per net ton; Cast Scrap, $16 to $16.50 per gross ton; Iron Rails, $24 to $24.50, gross; Steel Rails, long, $24 to $24.50, gross; Steel Rails, short, $18.50 to $19, gross; Iron Axles, $27.75 to $28.25, net; Car Wheels, $20.75 to $21, gross.

Iron Bars.—There is no change reported in the general tone of the market. The figures of a week ago hold good at this date. We quote, f.o.b. Cincinnati: Iron Bars, in carload lots, 1.92c., with half extras. Less than carload lots, 2.02c., with full extras; Steel Bars, 1.72c. for carload lots, with half extras; Base Angles 2.25c. Plates 3-16 and heavier, 2.15c., carload lots.

Cleveland.

CLEVELAND, OHIO, September 16, 1902.

Iron Ore.—At the beginning of the present week all ports along the south shore of Lake Erie are blocked with tonnage waiting a chance at the unloading machinery. The blockade, which is as severe as it has been at any time during the summer, is due to the fact that cars are scarce. Rates are unchanged, and conditions which have appeared during the week have made it a question whether there will be a change from now to the end of the season. The condition in which the blast furnaces are now finding themselves, promising a series of delays and shut downs during the entire winter, has eased up the demand for Iron Ore and the movement may not be as near to 25,000,000 tons as has been generally supposed.

Pig Iron.—The shortage of Pig Iron in this territory has reached the point where importations are necessary. The home furnaces are now in such condition that it will be impossible to give the foundries not provided with contracts any material and even some foundries holding contracts have been but a very little better supplied, both classes therefore being forced into the foreign markets to obtain their supply of material. The first deliveries will be made the first week in October. The Iron purchased analyzes well, being of a little better grade than the home No. 2 and a shade off of the domestic No. 1. The price that has been paid ranges between $23.50 and $25, delivered. The exact amount sold in this territory is hard to ascertain, but one sale amounted to 2000 tons. The furnaces in the Valleys have about all resumed operations, only two or three remaining out of blast. The Coke supply has not eased up permanently, however, by any means, and as they are running on a hand to mouth supply it is constantly feared that the furnaces will again have to go out of blast. It is now apparent that many of the furnaces making Foundry Iron will not be able to clear up the deliveries on this year's contracts much before April 1 next year. This is having a retarding effect upon the forward rush of buying, which has been a feature for the last year. Furnacemen are refusing to make quotations on material for delivery during the first half of next year, although a few of them are still quoting for second half the same price which has prevailed hitherto on first and second quarter delivery—namely, $21 for No. 2 at the furnace. Basic furnaces are not quoting a price for Standard Iron because they have been producing little or none of it. The short supply of Coke has about made off Basic a drug on the market and the quotation of $20.50 at the furnace is a little weak. The Bessemer producers are in about the same predicament, and many of them find that a good part of their output will have to be delivered in the second quarter of next year, whereas contracts call for first quarter delivery.

Finished Iron and Steel.—Some conditions, which have not been analyzed as yet in the foreign market, are permitting the importation of certain grades of Steel, mostly raw material, into this territory at a less price than can be met by the local producers. It has been learned, for instance, that Bessemer Billets of a foreign make are now being imported into this district as low as $28, which is less than the home price, the same material having been sold here at $30, which was the last quotation. This will affect the Bar market slightly, as many of the mills, in lieu of Billets, have been selling Bars when the requirements are for less than 4 x 4 inch. The one thing that is likely to prevent a very large importation of this material is the fact that many of the consumers have found that they cannot use the product to advantage because of the quality. Selling of Plates continues to be very heavy for future delivery, and, in fact, in some instances, the output for the first half of next year has been oversold. The smaller mills have been selling material here at 2c. at the mills, getting all of the business they can take care of. In some few instances sales have been made as far ahead as February 1 at the advanced price. The demand for 3-16 inch Plates has been extraordinary. The Sheet trade, however, does not show that improvement, which has been looked for and the market is quite weak. There seems to be an absence of demand, which the mills are not able to account for unless it is that there is actually a surplus of production. Prices, however, have not changed. They are 3.10c. to 3.20c. for No. 27 Black as a base at the mills and 3.35c. to 3.50c. out of stock. Galvanized Sheets are still bringing 4.50c. at the mill for No. 27 as a base. On Structural Steel stock quotations have not changed in the least, being from 2.50c. to 3c., and the trade has been as heavy as the stock will permit, the jobbers carrying a single weight for a certain size. Other material for spot delivery has been sold by the mills at 2.60c., at the mill, which brings the price above 3c., delivered, Cleveland. In no instance has any of this premium material been sold into next year. The larger mills are all selling for first half delivery, now having nothing to sell for this year. It is also evident that their supply for the first half has about been sold up. They are adhering to the 1.60c., Pittsburgh, quotation on all of this advance business. Bar Steel sales have been heavy of late. The mills are all sold up for this year and are selling well into next season, getting the same prices which have prevailed since spring. Quotations are 1.60c., Pittsburgh, for Bessemer, and 1.70c., Pittsburgh, for Open Hearth. The demand for material on contracts has tied up the mills in some instances. On Bar Iron the market is not quite so strong. The quotation of 1.80c., Pittsburgh, is generally adhered to, but upon a large order that price might be shaded, as, in fact, it is understood has been done, 1.80c., Youngstown, having been accepted in some instances. The orders have not been coming in as rapidly as the producers might wish for. Rail sales have been brisk for next year's delivery at $28, and the output of the larger mills is pretty well taken up. On Light Rails there is still a spot demand, and it is said that some of the mills are in better shape than has been supposed, a few orders having been taken for November delivery, on which the price ranges between $38 and $40 at the mill.

Old Material.—The Scrap trade has been moving along on an even keel for the last week with a moderate business. Prices do not change from previous quotations, which are as follows: No. 1 Wrought, $19.50, net; Iron Rails, $27.50, gross; Iron Axles, $28, net; Cast Borings, $10, gross; Wrought Turnings, $15.25, gross; Cast Scrap, $16, net; Car Wheels, $19, gross; Heavy Melting Steel, $19, gross; Old Steel Rails, $20, gross.

Pittsburgh.

(By Telegraph.)

PARK BUILDING, September 17, 1902.

Pig Iron.—From 15,000 to 20,000 tons of foreign Bessemer Iron have been bought for shipment in the Pittsburgh district, and other large lots are under negotiation. It is claimed the necessity for importing Iron would not exist were it not for the fact that the railroads are unable to handle the tonnage of the Pittsburgh and Valley districts, and cannot deliver Coke fast enough to the blast furnaces to allow them to get out their maximum of Pig Iron. It is admitted that the importation of such large lots of foreign Iron may unsettle things, but the railroads alone seem responsible for it. The heavy inquiries for Iron from this country are having the effect of putting up the market on the other side. Foreign Bessemer Iron has sold at about $21.50, but to-day from $22.50 to $23 is quoted. Domestic Bessemer Iron for last quarter is held at $21.75 to $22 at Valley furnaces. Forge Iron continues quiet, and is offered at $20.75 or lower for shipment this year. No. 2 Foundry Iron for shipment this year is held at about $22 at furnaces, or $22.75, Pittsburgh.

Steel.—The Steel market is considerably agitated over the large purchases of foreign Steel that have already been made and by others that are under negotiation. Two lots of 10,000 tons each have been bought by Steel and Wire inter-

ests, and from 25,000 to 30,000 tons more are under negotiation and may be closed at any time. The foreign market on Steel is advancing, and it is said that foreign Billets cannot be laid down in Pittsburgh to-day at less than about $29 and Sheet Bars at about $30.50 to $31. Domestic Steel is quoted at about $31, but on a firm offer and in competition with foreign Steel the price of $31 could no doubt be materially shaded. Domestic Sheet Bars for delivery in last quarter have sold as low as about $31.50, at maker's mill.

(By Mail.)

A heavy tonnage in foreign Bessemer Iron and Billets is under negotiation, and some heavy sales have already been made. A local concern have bought 8000 to 10,000 tons of foreign Bessemer Iron at a price between $21.50 to $22, Pittsburgh. Other large lots of foreign Bessemer Iron are under negotiation, and it looks as though a good deal of Iron from the other side will be brought into the Pittsburgh district before the close of the year. The importation of foreign Iron has been made necessary by the continued scarcity of domestic, due to enormous consumption, and also to shortage in supply on account of bad deliveries of Coke. Quite a tonnage of foreign Foundry Iron is also coming into Pittsburgh, at prices ranging from $21.50 to $22, delivered. Some heavy sales of foreign Steel have been made. A Western Wire and Nail concern have bought 10,000 tons of foreign Rod Billets for delivery in first quarter, at a price that figures out about $28.50, Pittsburgh. A leading Steel concern have bought 10,000 tons of 2 to 4 inch foreign Basic Bessemer Billets for delivery in first quarter. Other heavy inquiries are in the market, one concern asking for 15,000 tons, and another for from 5000 to 10,000 tons, for shipment commencing November or December. The heavy inquiries for Pig Iron and Steel from this country are having the effect of putting the market up on the other side, and foreign prices on both Pig Iron and Steel have gone up from 50c. to 75c. a ton. Foreign Bessemer Iron has been offered recently as low as $21.50, Pittsburgh, but prices asked to-day are nearly $1 a ton higher. Foreign Steel was quoted about a week or ten days ago at very close to $28, Pittsburgh, but the market to-day is $28.75 to $29. The fact that foreign Steel is looking up in price will no doubt have the effect of checking any material decline in prices of domestic Steel. The market on local Bessemer Pig Iron is exceedingly firm, and $21.75 to $22, at Valley furnace is being quoted for last quarter and $21 for first quarter. Domestic Steel is held at about $31, but it is possible on a firm offer this might be shaded. In Finished Iron and Steel there is nothing of interest to report. Demand for Structural Material and Plates is exceedingly heavy, and a large tonnage in both is being placed for next year. Bars are fairly active and prices are firm. Sheets, Tin Plate, Wire and Wire Nails continue dull, and the market on Wire Nails is somewhat demoralized, some low prices having recently been made on Nails for shipment to extreme Western and Southern points. There has been a large tonnage of Heavy Melting Stock for Open Hearth purposes sold in the last few days, two leading consumers having bought between them fully 20,000 tons at about $22, Pittsburgh. There have also been other large sales of Old Material, and the Scrap market is more active than for some time.

Rods.—We quote Bessemer Rods at $36, maker's mill, Pittsburgh, but this price has been shaded on some recent sales. Open Hearth Rods are held at about $37, Pittsburgh.

Muck Bar.—The local market on Muck Bar is somewhat quiet, and we quote best grades at $35.50 to $36, Pittsburgh. A leading consumer in this district has recently imported a round tonnage of foreign Muck Bar at about $35, or lower, delivered here.

Ferromanganese.—We quote German and English Ferro at $51 to $51.25, f.o.b. Pittsburgh. A sale of 50 tons of German is reported.

Structural Material.—From 20,000 to 25,000 tons of bridge work have been placed in the past week and all for next year's delivery. A great deal of tonnage is under negotiation, and the demand for Structural Steel for new buildings is very heavy. Most of the tonnage being placed now is for delivery next year, as the mills are so well filled up they have practically no material to spare for this year. Some foreign tonnage in Beams and Channels is under negotiation, but the sections rolled by mills on the other side are heavier than by domestic mills, and this places foreign Material at considerable disadvantage. Prompt Beams and Channels in small lots continue to bring 2.50c. to 3c. and higher. Official prices, which apply only on Material for extended delivery, are as follows: Beams and Channels, up to 15-inch, 1.60c.; over 15-inch, 1.70c.; Angles, 3 x 2 up to 6 x 6 inch, 1.60c.; smaller sizes, 1.55c. to 1.60c.; Zees, 1.60c.; Tees, 1.65c.; Steel Bars, 1.60c., half extras, at mill; Universal and Sheared Plates, 1.60c. to 1.85c.

Plates.—A heavy tonnage continues to be placed, and some of the mills now refuse to quote, except for delivery after March, 1903. A good deal of tonnage is being refused by the leading mills on account of inability to make deliveries wanted. The large new Plate mill of the Cambria Steel Company has been tested and will be in full operation within a short time. Prices for Plates for prompt shipment are from 1.75c. to 1.85c., and some mills quote these prices for delivery in January and February of next year. Official prices on Plates for shipment next year are as follows: Tank Plate, ¼ inch thick and up to 100 inches in width, 1.60c. at mill, Pittsburgh; Flange and Boiler Steel, 1.70c.; Marine, Ordinary Fire Box, American Boiler Manufacturers' Association specifications, 1.80c.; Still Bottom Steel, 1.90c.; Locomotive Fire Box, not less than 2.10c., and it ranges in price to 3c. Plate more than 100 inches wide, 5c. extra per 100 lbs. Plate 3-16 inch in thickness, $2 extra; gauges Nos. 7 and 8, $3 extra; No. 9, $5 extra. These quotations are based on carload lots, with 5c. extra for less than carload lots; terms, net cash in 30 days.

Sheets.—We note a fair demand for Black Sheets of the lighter gauges, but Galvanized are dull and prices are more or less demoralized. Some of the Black Sheet mills report that they are receiving more inquiries, and it is thought demand will show still further improvement. We quote No. 27 Black Sheets, box annealed, one pass through cold rolls, at 2.85c. to 2.90c., and No. 28 at 2.95c. to 3c. for carloads and larger lots. Low prices are being named on Galvanized Sheets, as low as 75 and 7½ off having been done in special cases. The general market is about 75 and 5 off in carloads and 75 off in small lots. These prices are all f.o.b. at mill

Hoops and Bands.—A fair amount of tonnage is being placed, but in exceptional cases prices have been more or less shaded. We quote Hoops at 1.90c. for 250-ton lots and over and 2c. in carloads. Bands are 1.90c. for Bessemer stock, 12-gauge and heavier, while for Open Hearth stock $2 per ton advance is charged.

Bars.—A fair amount of tonnage is being placed in Steel Bars, which, with old contracts, keeps the mills fairly busy. The high prices of Pig Iron and Scrap are having the effect of strengthening prices on Iron Bars, which are very strong. We quote Steel Bars at 1.60c., at mill. All specifications for less than 2000 lbs. of a size are subject to the following differential extras: Quantities less than 2000 lbs., but not less than 1000 lbs., 0.10c. per lb. extra. Quantities less than 1000 lbs., 0.30c. per lb. extra, the total weight of a size to determine the extra, regardless of length. We quote Iron Bars at 1.80c. to 1.85c. in carloads and 1.90c. in small lots, f.o.b. Pittsburgh, half extras as per National card.

Skelp.—The market is quiet and prices are weaker than for some time. We quote Grooved Iron Skelp at 2.02½c. to 2.05c. and Sheared at 2.10c. to 2.15c. Steel Skelp is held at about 2.15c., Pittsburgh. We note a sale of 500 tons of Grooved Iron Skelp at 2.05c., Pittsburgh.

Merchant Steel.—A good volume of business is being placed, several of the mills reporting their August shipments as having been the largest in any month in their history. Prices are without special change, and we quote: Tire, 2.15c. to 2.25c.; Spring, 2.25c. to 2.35c.; Toe Calk, 2.30c. to 2.40c., base; Sleigh Shoe, 2.15c. to 2.25c. Differentials are as follows: Less than 2000 lbs. of a size and not less than 1000 lbs., 10c. advance; less than 1000 lbs. of a size, 30c. advance; Cold Rolled Shafting is 47 per cent. off in carloads and 42 per cent. in less than carloads delivered in territory East of the Mississippi and North of the Ohio rivers. Tool Steel is 6½c. to 10c. for ordinary grades and 12c. and upward for special grades.

Merchant Pipe.—The volume of business for this season of the year is, we are advised, fairly satisfactory. Prices are firm, with the exception of the smaller sizes of Merchant Pipe, on which some mills are shading. The order for 300 miles of 6-inch Pipe for export, referred to last week, has not yet been placed. Discounts to jobbers, which occasionally are slightly shaded, are as follows:

Merchant Pipe.	Black.	Galvd.
⅛ to ½ inch, inclusive	60	48
¾ to 12 inch, inclusive	67	55

Iron and Steel Scrap.—We note a very large movement in Heavy Melting Stock, from 20,000 to 25,000 tons having been sold in the past week. There is also a good volume of business in Cast Iron Scrap and the whole line of Old Material is more active than for some time. We quote No. 1 Railroad Wrought Scrap at $21.50 to $22, net tons; Heavy Melting Stock, $22 to $22.25, gross tons; Cast Iron Borings, $12.50 to $13, gross tons, delivered either Valleys or Pittsburgh. Cast Iron Scrap is high, on account of scarcity and high prices of No. 2 Foundry Iron, and readily brings $19.50 to $20 in gross tons. Car Wheels are also very scarce and are held at $21.75 to $22 in gross tons. No. 1 Busheling Scrap is $18 in net tons and Wrought Iron Turnings about $14 in net tons. We note sales of 20,000 to 25,000 tons of Heavy Melting Stock for open hearth purposes at $22 to $22.25, delivered in Pittsburgh district; also 2500 tons of Cast Iron Borings at $19.50, Pittsburgh, and 1000 tons of No. 1 Busheling Scrap at $18, net, delivered Pittsburgh.

Coke.—Prices to be charged for Furnace Coke for the first six months of 1903 is the principal item of interest in the Coke trade at the present time. The consensus of opin-

ion seems to be that $3 for Furnace Coke for next year would be about the right price, but one or two leading Coke operators think this is too high and that a more conservative price would be $2.50 a ton. However, blast furnaces that are selling Pig Iron for 1903 delivery seem anxious to know what their Coke will cost for next year and seem disposed to contract at about $3 a ton. Several such contracts have already been made. It is a fact that as high as $6 a ton has been paid for Furnace Coke for September shipment, while $4 to $5 a ton is being offered for delivery over last quarter. Output of Coke continues to break all records and last week was 254,951 tons for the upper Connellsville region and nearly 50,000 tons for the lower Connellsville region. Nearly every yard in the Coke regions is piled full of Coke, the railroads being utterly unable to furnish motive power and cars fast enough to move it.

The Hazard Mfg. Company, Wilkes-Barre, Pa., manufacturers of Iron, Steel and Galvanized Wire Rope, have leased Room 21, Conestoga Building, Pittsburgh, for their exclusive use. N. P. Hyndman has been sales agent for this concern in the Pittsburgh district, but the Hazard Mfg. Company have given him the assistance of Fred. North and Mr. North will in the future look after their interests in detail in the Pittsburgh district, Mr. Hyndman continuing to give the Wire Rope and Insulated Wire business the necessary supervision, as heretofore.

Frank Samuel, Harrison Building, Philadelphia, dealer in Pig Iron, Steel, Scrap and Ore, has opened an office in Room 607, Fitzsimmons Building, Pittsburgh, with William H. McElroy in charge.

The Sheet Steel Company, recently organized in Pittsburgh, and who have taken over the Tuscora Steel Company, at Newcomerstown, Ohio, have opened offices in Room 805, Lewis Block, Pittsburgh. The new concern are manufacturers of fine Steel Sheets for special purposes.

The New York Machinery Market.

NEW YORK, September 17, 1902.

Now that the summer is over every one has settled down to business again, and from present indications the coming months have a nice amount of business in store. Even at this time a very favorable number of orders are being closed. Inquiry is so good that it forecasts excellent trade conditions for the fall and winter. The machine tool trade can well be taken as a criterion, as when tools are in demand a general expansion of machinery business is indicated. The machine tool trade to-day is considered very satisfactory.

The healthy business, consisting of numerous small orders, continues and the situation is made a little more interesting by the appearance of several good sized proportions.

The large list of the General Electric Company, which we referred to last week, is now being brought up for the consideration of bidders. A preliminary memorandum has just been sent to the trade. This gives an idea of the class of machinery that will be required and is taken in the trade as a forerunner of the full specifications which are expected soon to follow. The list that is out now is said to be a good one, and it is the impression in the street that the amount of purchases will run well into six figures.

Bids for a fair sized lot of tools and appurtenances were opened at the Watertown Arsenal by the Ordnance Department at Watertown last Saturday. The list was sent out privately, it is said, instead of being advertised in the usual way. The bids were as follows:

Twenty 22-inch lathes.—Niles Tool Works Company, $11,860 and $10,480; Manning, Maxwell & Moore, $14,000 and (20-inch) $12,000; Hill, Clarke & Co., $12,000; Chandler and Farquhar, $9,440; Fairbanks Company, $10,200, $14,740, $12,760, $13,820.

Twenty Portable Drills.—Niles Tool Works Company, $2720; Manning, Maxwell & Moore, $2800; Hill, Clarke & Co., $2812; Fairbanks Company, $2830; Thomas H. Dallet & Co., $2822.35.

Twenty Electric Motors.—Niles Tool Works Company (Crocker-Wheeler), $4860, (Bullock) $5740, (Northern) $4680; Manning, Maxwell & Moore, $6675; Hill, Clarke & Co., $5400; General Electric Company, $4680.

Twenty Pillar Shapers.—Niles Tool Works Company, $7640; Manning, Maxwell & Moore, $15,400, $11,200, $12,300, $9900; Hill, Clarke & Co., $8800, $9100, $9500, $11,000; Chandler & Farquahar, $8600.

Twenty Drill Chucks.—Niles Tool Works Company, $124; Manning, Maxwell & Moore, $127; Hill, Clarke & Co., $126.75; Fairbanks Company, $95, $105, $136.

Twenty Threading Tools.—Niles Tool Works Company, $138.80; Manning, Maxwell & Moore, $190; Hill, Clarke & Co., $143.95; Fairbanks Company, $192.20.

Twenty Lathe Chucks.—Niles Tool Works Company, $228 (6-inch), $498 (12-inch); Manning, Maxwell & Moore, $218 (6-inch), $465 (12-inch); Fairbanks Company, $250 (6-inch), $530 (12-inch).

Other items included quantities of shafting, belting and lathe dogs.

The condition of the European machine tool trade is called to the attention of machinery builders and merchants by the announcement which we print in another column to the effect that Otto Diechmann will again represent prominent American machine tool builders on the Continent. While a few machine tool orders are finding their way into this country from Europe, demand for all classes of machinery abroad is still very poor. In Germany machinery merchants are not only in need of orders, but seem also to be hard pressed for cash. This fact is evidenced by the low prices at which they are willing to resell American tools in this country. As an illustration of this we have just heard of a transaction involving a heavy planer. The machine was just purchased for shipment to Chicago by the American merchant who originally sold it; he paid a little more than half of the amount he originally received for it. Another instance of the German dealer's necessity to close out American tools at a loss is shown by a recent transaction where the principal sold for $1000 cash seven shapers of well-known make which cost him $250 each. In this case the lucky purchaser was in France.

Speaking of France recalls a report which comes direct, to the effect that a large German machinery house who have been very successful in selling American tools throughout the Continent have decided to inaugurate a more active campaign in that country.

We are permitted to announce officially that Schuchardt & Schutte will establish another branch in Belgium. It will be located at Liege and will consist of offices and warerooms. The present branch at Brussels will be continued.

It is to be expected that large purchases of machine shop equipment will soon be made by the Pennsylvnaia Railroad, who, we are authoritatively informed, are planning extensive additions to their Altoona shops. W. W. Armstrong, general superintendent of motive power, with offices at Altoona, is in charge of the work.

W. J. Harahan, chief engineer of the Illinois Central Railroad Company, confirms the report that large repair shops are to be established at Memphis, Tenn. The work has, in fact, been commenced. It will involve an outlay of about $400,000. The buildings to be erected will consist of a machine shop, a boiler shop, a round house, a car repair shop, a planing mill, a store building, offices and coal chutes. Car repair yards, with several car sheds, will be arranged, together with the necessary side tracks and yard facilities. The buildings will be of brick, sheet iron and frame. The largest will be the car repair shop, which will be over 300 feet in length. The machine shop will have a capacity for ten locomotives at a single time, the boiler shop for two and the round house, including the present one, for 25. The car shop and car repair yards will be capable of holding 270 freight cars undergoing repairs.

S. G. Barker & Son of Scranton, Pa., have begun the erection of a new plant on Carbon street which will take the place of their present plant. It is their intention to have a most modern foundry and machine plant in every particular. They will add considerable new machinery and equipment to take care of their increasing business. This firm manufacture railroad track scales and mining machinery and castings of all kinds, and are one of the oldest firms in this region, having been established by the late S. G. Barker in 1847 and now carried on by his sons.

A. & F. Brown of Elizabethport, N. J., manufacturers of power transmission machinery and appliances, are now adding to their plant. The extensions to the foundry are now under way. Plans are being prepared for the enlargement of the machine shop to such an extent as to increase its capacity about 70 per cent. The purchasing of new equipment will be largely a duplication of the machinery now in the plant. Cranes of 40 and 20 tons capacity will also be added.

Some time ago we referred to the fact that the A. B. See Electric Elevator Company of 220 Broadway, New York, intended moving to new quarters. We are now advised that a site in Jersey City has been selected. Contracts for the new buildings are about to be let.

Ground has been broken at Phillipsburg, N. J., for the long planned new shops of the Ingersoll-Sergeant Drill Company, whose offices are at 26 Cortlandt street and whose plant is located at Easton, Pa. The tract of land purchased is on the Delaware River, directly opposite the present plant at Easton. The machinery to be installed in the new buildings has not been decided upon as yet.

The Erie Railroad have placed a $10,000 order for snow flanges with the Q & C Company of 114 Liberty street. The latter concern have also booked a large order for power saws from the Berlin Construction Company of Berlin, Conn.

The Connecticut Railway & Lighting Company of South Norwalk, Conn., have just placed orders for the equipment to go into an extension to their power house. The boilers are of the Cahall type, built by the Aultman-Taylor Company, and sold by Thayer & Co. The Pennsylvania Iron Works will furnish the engines, which are to be direct connected to 500-kw. generators. A. V. Wainwright is the superintendent of the plant.

The Green Fuel Economizer Company of 74 Cortlandt street, New York, have been awarded the contract for the economizers in connection with the new power stations to be built by the North Jersey Traction interests. One of the stations is to be at Newark and the other at Secaucus, N. J. Each installation calls for over 3000 horse-power of economizers.

Thayer & Co. of 39 and 41 Cortlandt street captured the boiler order of the Buffalo & Susquehanna Iron Company, who are building a new plant at South Buffalo, N. Y. The order calls for 28 boilers, aggregating 7000 horse-power. They will be of the Cahall type, built by the Aultman & Taylor Company.

Probably the largest elevator contract ever awarded was closed last week by the Otis Elevator Company with the Metropolitan Life Insurance Company for the additions to their building, Fourth avenue, Twenty-third and Twenty-fourth streets, New York City. The new equipment consists of 23 high pressure passenger elevators, four hydraulic freight elevators and two electric passenger elevators, and contemplates converting the 13 passenger elevators in the original building, so as to operate them at the increased pressure. The plant, when complete, will consist of 40 hydraulic elevators, operated from one pumping station. N. Le Brun & Sons are the architects and V. J. Hedden & Sons of Newark, N. J., are the builders.

Thomas C. Maxfield, who for a number of years has been prominent in the engine trade throughout this country, has just brought out a new line of engines, boilers, feed water heaters and boiler feed pumps for this territory. He has opened offices at 39 Cortlandt street. The engines are built in seven types, ranging from 5 to 300 horse-power, and adapted for electric lighting and all other power purposes. One very interesting type of engine included in this line is of single cylinder construction equipped with a double valve, making it automatic. It is claimed that operating under ordinary conditions this engine will run with from 10 to 20 per cent. less steam than required for the ordinary single valve engine. As the load decreases this saving is of course increased.

The Columbia Lock Nut Company, Incorporated, George Brinton Wix, president and treasurer, have removed their office and works to Bridgeport, Conn., where the manufacture of the Columbia lock nut will be continued on a more extensive scale. Special machinery has been devised, which will several times increase the former capacity of the plant.

New York.

NEW YORK, September 17, 1902.

Pig Iron.—The principal event of the week has been the purchase by the largest consumer of Pig Iron in the metropolitan district of upward of 10,000 tons of American Foundry Iron for forward delivery at private terms. What business is being done for early delivery is in foreign Pig Iron, and further orders for importation have been placed by dealers. Lately there has been an advancing tendency in ocean freights, which are up about 25c. per ton from Middlesbrough. Some trouble is arising over the high silicon of English Bessemer Pig, and some lots imported for use in Steel works have been offered for resale to the foundry trade, being above 3 per cent. silicon. English trade custom is specifying a certain range for silicon in Bessemer Pig as an average, but Iron is shipped very much below and very much above that average. Since American Bessemer practice is based on relatively much lower silicon than that of Great Britain the English hematite is often extravagantly high. European sellers of Pig Iron are often offering Basic Bessemer Pig, high in phosphorus, manganese and sulphur. Since there are no Basic Bessemer plants in this country the Iron is absolutely useless in this market. For delivery in 1903 the following quotations are made: Northern Iron, at tidewater, No. 1 X, $23.25 to $24.75; No. 2 X, $22 to $22.75; No. 2 Plain, $21 to $21.75. Tennessee and Alabama brands, in New York and vicinity: No. 1 Foundry, $23.25 to $23.50; No. 2 Foundry, $22.25 to $22.50; No. 3 Foundry, $21.50 to $22.

Steel Rails.—We note sales aggregating about 20,000 tons by an Eastern mill to New England roads for 1903 delivery. Foreign makers are making some low prices in this country, coming close to the tidewater price of domestic mills and considerably under the figures at which domestic Rails can be laid down at Pacific Coast ports on the $28 mill price. We have not yet heard of any sales. We continue to quote $28, at Eastern mill, for Standard Sections.

Cast Pipe.—The demand for small lots is fully as brisk as previously reported, but contracts for good sized quantities are scarce. The Northern foundries are now badly hampered by the great scarcity of Coke, just as they were beginning to feel more comfortable over the supply of Pig Iron. They are obliged to pass a great deal of business for this reason, which is going to other sections. Quotations for future delivery are continued at $34 to $34.50, tidewater, for 8-inch, but an advancing tendency is noted on account of increasing cost.

Manufactured Iron and Steel.—Heavy bridge contracts are pending and will probably be closed this week. Railroad companies that have placed orders for bridges for 1903 delivery are increasing the quantity. The number of building projects in this locality for next year is growing, some of them being of large proportions. The outlook for Structural Material is thus very bright. The Plate trade is active, the best deliveries now reported being five to six weeks. Other finished product continues in good demand. We quote, at tidewater, as follows, but for small lots and prompt delivery much higher prices are being obtained for Structural Material and for Plates: Beams, Channels and Zees, 2c. to 2.25c.; Angles, 2c. to 2.25c.; Tees, 2c. to 2.25c.; Bulb Angles and Deck Beams, 2.10c. to 2.25c. Sheared Steel Plates are 2c. to 2.10c. for Tank, 2.10c. to 2.20c. for Flange, 2.25c. to 2.40c. for Fire Box. Refined Bars are 1.95c. to 2c.; Soft Steel Bars, 1.95c. to 2.10c.

Old Material.—A very good demand is experienced for all classes of Old Material and stocks are light. Old Iron Rails are being imported to some extent. Dealers are confident that within 30 days prices will be considerably higher. Quotations are as follows, per gross ton, f.o.b. cars in this vicinity:

Old Iron Rails	$23.00 to $24.00
Old Steel Rails, long lengths	22.50 to 23.50
Old Steel Rails, short pieces	19.50 to 20.00
Relaying Rails, heavy sections	30.00 to 31.00
Relaying Rails, lighter sections	34.00 to 35.00
Old Car Wheels	19.00 to 20.00
Old Iron Car Axles	27.00 to 28.00
Old Steel Car Axles	27.00 to 28.00
Heavy Melting Steel Scrap	19.50 to 20.00
No. 1 Railroad Wrought Scrap Iron	23.00 to 24.00
Track Scrap	20.00 to 21.00
Busheling Scrap	15.00 to 16.00
No. 1 Machinery Cast Scrap	18.00 to 19.00
Stove Plate	12.00 to 13.00
Wrought Turnings, delivered at mill	16.50 to 17.50
Cast Borings, delivered at mill	10.50 to 11.00

Metal Market.

NEW YORK, September 17, 1902.

Pig Tin.—The market has been characterized by a weak and declining tendency. As compared with last week prices have had a considerable decline. Business has been very light, consuming interests still showing the backwardness which they have manifested for some weeks past. There is a good deal of spot stock at present in the market. Closing prices to-day were as follows: Spot, 26.35c. to 26.55c.; September, 26.25c. to 26.50c.; October, 26c. to 26.35c.; November, 25.55c. to 26c.; December, 25.35c. to 25.55c. The London market also declined considerably, the net drop being £2 5s., as compared with last week. To-day's closing was £121 15s. and £117 15s. Shipments from the Straits during the first half of this month were very large, amounting to 2650 tons, as against 2070 tons for the corresponding period of last year. Arrivals thus far this month amount to 2409 tons, and there are 3114 tons afloat.

Copper.—The market has recovered entirely from the two days' boom of last week. Prices have declined daily, and the market is in about the same condition as it was prior to the rise. Offerings are quite urgent and buyers scarce. To-day's closing prices were the lowest of the week, and were as follows, for spot to December delivery: Lake, 11.70c. to 11.90c.; Electrolytic, 11.60c. to 11.65c.; Casting, 11.50c. to 11.60c.; Standard, 11c. to 11.30c. There was a sale on 'Change to-day involving 30,000 lbs. Electrolytic for November delivery at 11.60c. The London market has declined somewhat from last week, closing to-day as follows: Spot, £53 1s. 3d.; Futures, £53 6s. 3d.; Best Selected, £56 10s. Exports so far this month aggregate 5700 tons.

Pig Lead.—The market is still unchanged as to price, but shows more buying activity than during the last few months. The Smelting & Refining Company quote Desilverized on a basis of 4.12½c. for spot and 4.10c. for futures. London advanced 1 shilling 3 pence, being quoted to-day £10 18s. 9d.

Spelter.—Prices are unchanged here, but lower in the West. Demand is extremely light. Consumers are said to be well supplied. Spot is still nominally at 5.50c. here, but shipments from the West are freely offered at 5.35c. In St. Louis spot has declined to 5.15c. and October delivery may be obtained there for 5c. London is unchanged, quoting £19 7s. 6d.

Antimony—Is unchanged. Hallett's is quoted 8c.; Cookson's, 10c., and other brands, 7¾c.

Nickel.—No change is noted. Large quantities down to ton lots are now quoted at 40c. to 47c. per lb., according to size and term of order. Smaller lots are quoted as high as 60c., according to quantity.

Quicksilver.—The market is quiet and unchanged, the ruling quotation being $48 per flask of 76½ lbs. each in lots of 50 flasks or more. London is unchanged at £8 15s.

Tin Plates.—The market is dull and uninteresting, with an absence of any important buying. Prices are without change. The American Tin Plate Company are quoting for

delivery up to December 1 on the basis of $4.19 per box for Standard 100-lb. Cokes, f.o.b. New York, or $4, f.o.b. Pittsburgh.

John Stanton reports the Copper production in the United States and of the foreign reporting mines and United States exports as follows, in gross tons of 2240 lbs.:

	Reporting mines.	Outside sources.	Total product.	U.S. foreign mines.	Product U. S. exports.
First half 1895.....	70,612	9,100	79,712	42,484	34,215
Second half 1895..	84,885	6,600	91,485	43,674	30,507
Total 1895.....	155,497	15,700	171,197	86,178	64,722
First half 1896.....	94,180	7,200	101,380	42,255	58,216
Second half 1896...	95,314	7,200	102,514	43,941	67,287
Total 1896.....	199,494	14,400	203,894	86,196	125,503
First half 1897.....	103,651	5,000	108,651	44,263	64,870
Second half 1897...	100,555	6,900	107,455	44,007	64,340
Total 1897.....	204,206	11,900	216,106	88,270	129,210
First half 1898.....	112,687	7,800	120,487	40,880	68,284
Second half 1898...	103,535	10,250	113,785	43,674	76,831
Total 1898.....	216,222	18,050	234,272	84,554	145,115
First half 1899.....	111,987	12,500	124,487	43,629	56,460
Second half 1899...	118,818	18,900	137,719	45,611	63,351
Total 1899.....	230,806	31,400	262,206	89,240	119,811
First half 1900.....	114,177	20,400	134,577	43,153	90,747
Second half 1900...	113,810	20,400	134,104	46,278	63,335
Total 1900.....	227,987	40,800	268,681	89,431	160,082
First half 1901.....	112,794	20,600	133,394	46,847	50,027
Second half 1901...	110,561	21,300	131,861	53,394	44,339
Total 1901.....	223,355	41,900	265,255	100,241	94,366
First half 1902.....	117,748	22,700	140,448	52,546	97,960
July, 1902.....	22,749	4,000	26,749	9,210	11,733
August, 1902.....	23,196	*2,100	25,296	9,504	12,429

* The decrease in "Outside Sources" this month is caused by the largest of them becoming "Reporting Mines."

Iron and Industrial Stocks.

The stock market has been adversely affected by tight money the past week. The effect has been felt, however, more in checking transactions than in reducing quotations. All industries are slightly lower than at the corresponding period in the previous week with the exception of Pressed Steel common and Virginia Iron, Coal and Coke, on which a moderate advance is recorded.

Dividends.—The Union Switch & Signal Company of Pittsburgh have declared the regular quarterly dividend of 2 per cent. on the preferred and 1 per cent. on the common stocks, payable October 10 to stock of record October 1.

The Westinghouse Air Brake Company of Pittsburgh have declared the usual quarterly dividend, 2½ per cent. regular and 3½ per cent. extra, payable October 10. Owing to the fact that the payment and the annual meeting both take place during the first week of October the transfer books of the company will be closed from September 25 to October 10, both inclusive.

The directors of the Ohio Fuel Supply Company of Pittsburgh have declared the initial quarterly dividend of 1½ per cent., thereby placing the stock on a 6 per cent. basis. This dividend is payable October 15. This organization is a union of the natural gas interests of Southeastern Ohio, owned and controlled by Treat & Crawford, to which field was added tthe city of Zanesville, Ohio. The organization was completed June 20.

The American Brake-Shoe & Foundry Company have decleared a quarterly dividend of 1¾ per cent. on their preferred stock, payable October 1.

The Safety Car, Heating & Lighting Company have declared a regular quarterly dividend of 2 per cent. and an extra dividend of 1 per cent., payable October 1.

The American Iron & Steel Mfg. Company have declared a dividend of 1¼ per cent. on their preferred stock, payable October 1 to stock of record September 24.

The United Shoe Machinery Company have declared the regular quarterly dividends of 1½ per cent. on the preferred stock and 2 per cent. on the common stock, payable October 15.

The Crucible Steel Company have declared the regular quarterly dividend of 1¾ per cent. on their preferred stock, payable September 29. Books close September 17 and reopen September 30.

The American Smelting & Refining Company have declared the regular quarterly dividend of 1¾ per cent. on their preferred stock, payable October 7. Books close September 23 and reopen October 8.

The George A. Fuller Company have declared the regular quarterly dividend of 1¾ per cent. on their preferred stock, payable October 1. Books close September 27 and reopen October 2.

The Washburn Wire Company have declared the regular quarterly dividend of 1¾ per cent. on their preferred stock, payable October 1. Books close September 24 and reopen October 1.

The Alabama Steel & Wire Corporation.—The Alabama Steel & Wire Corporation have been incorporated at Hartford, Conn., with a capital stock of $5,000,000. E. T. Schuler and G. H. Schuler of Birmingham, Ala., and Samuel I. Knight of New York City are the incorporators. This new corporation will take over the business of the Alabama Steel & Wire Company at Ensley, Ala., manufacturers of wire rods, wire and wire nails. The concern will build an open hearth steel plant to make their own steel, plans for which are being drawn by the Garrett Cromwell Engineering Company of Cleveland, Ohio. Contracts for the building of this steel plant are to be let this month.

Trade Publications.

Steam and Hydraulic Valves, Fittings and Pipe.—The Crane Company, whose factories and headquarters are in Chicago, with branches in the leading cities of the country, have issued a complete pocket catalogue of the products which they manufacture, comprising 464 pages. This exceedingly convenient volume presents illustrations, price-lists and full detailed information relative to all their standard goods, such as globe, angle, check and cross valves, straightway valves, brass and iron cocks, iron and brass fittings, flanged fittings, engine and boiler trimmings, steam fitters' and engineers' tools, &c.; low pressure and medium pressure goods, such as iron straightway valves and flanged fittings; extra heavy goods, covering iron straightway valves, iron and brass globe, angle and cross valves, screw and flanged iron fittings and pipe bends; hydraulic goods, consisting of iron straightway and check valves, brass straightway globe and check valves and iron and brass fittings. A number of pages are devoted to brass, wrought iron and steel pipe. The catalogue also presents a great deal of data of interest to engineers and practical suggestions to fitters.

Marking Crayon.—The D. M. Steward Mfg. Company of Chattanooga, Tenn., are introducing a new crayon for marking on iron. It is of unusual size, and in the form of a square stick 1 inch by 5 inches long. The mark it makes is an almost pure white. It is very strong and durable.

The Western Puddling Scale.—The bi-monthly settlement of the Amalgamated puddling scale was made at Youngstown, Ohio, on Tuesday, September 16, between officials of the Amalgamated Association and the Republic Iron & Steel Company. It was found that the average price of shipments of iron bars in July and August did not entitle the men to any advance in wages for September and October. Puddling remains at $6 a ton and heating and rolling 70 cents a ton.

The American Shipbuilding Company of Cleveland have closed a contract for another large vessel for July, 1903, delivery. It will be built for the Zenith Steamship Company at the Globe yard in Cleveland. She will be 416 feet keel, 50 foot beam, 28 feet deep, and will have 12 hatches with 24-foot centers. Construction will be under a design for convenient operation of clamshell unloading buckets. The vessel will have triple expansion engines and two Scotch boilers. The American Shipbuilding Company are preparing plans for a steamer to be larger than anything yet attempted on the great lakes. Contracts have not yet been closed, and the prospective purchaser is not known, but it is believed to be W. W. Brown of Cleveland. The vessel, if built, will be 550 feet long, or 54 feet longer than any lake boat in existence. She will be 56 feet beam and 32 feet molded depth. A vessel of this class would of necessity be used for special trade and would be able to load only at the Superior or Duluth docks, since vessels having only 28 foot depth have difficulty getting under the loading machinery at other ports. It is claimed also that a vessel of this size would be unable to load to her full capacity because of the average depth of water in the channels connecting the lakes. For numerous other reasons it is claimed by vesselmen that a steamer of this size would be unsatisfactory and a poor investment so far as the lake trade is concerned.

Six furnaces out of 12 at the open hearth steel plant of the Clairton Steel Company, at Clairton, Pa., are in operation and two more will be started next week. One of the three blast furnaces of the St. Clair Furnace Company, at Clairton, will be started in January and the other two about March or April.

The United States Steel Tie Company of Pittsburgh will apply for a charter on October 6.

The Boston Machinery Market.

BOSTON, MASS., September 13, 1902.

There is very little to say regarding the local machinery market. Dealers generally report trade very quiet, but they consider that as the vacation season will not be over until October it is only natural that there should be a continuance of the summer's dullness. One or two houses report an unusually heavy business during August, but this was attributed to special conditions. The summer's quiet has enabled factories to make some inroads on their accumulated orders, and there is not so much complaint of slow deliveries as was heard a month or six weeks ago. Dealers in machinists' tools report a gratifying number of inquiries in their line. Altogether the atmosphere in the machinery and machinists' tools trade very much resembles that out of doors. It is brisk, active and optimistic, the activity being that of expectation rather than of present business.

The Eastern Bridge & Structural Company have been awarded the contract to furnish the steel for the Old State House Station of the East Boston Tunnel. The contract calls for 115 tons of steel, the first delivery to be made by October 1, the second delivery by November 1, and the work to be completed by December 1. The company's price was $135 per ton. The other bidders were the New England Structural Company and H. B. Converse & Co. As the contract was not awarded until September 2, its terms entail some quick work, but the company have stock sufficient to meet the emergency. The company are building the Westville street school house in the Dorchester district of Boston, the contract calling for 200 tons of steel. They are also building four bridges for the Boston, Revere Beach & Lynn Railroad Company, a steel coal shed for a local coal dealer and a power house for the Simplex Electric Company in Cambridge, Mass.

Boston has just heard a slight echo of the machinists' strike of 18 months ago. At that time Golding & Co., manufacturer of printers' machinery, tools and supplies, Fort Hill square, compromised with their machinists. When the firm issued their schedule of hours for the coming winter their employees demanded 54 hours per week at thir previous pay for 60 hours. The firm claimed that they had increased wages 19½ per cent. in the past year and a half, and they refused to accede to this demand, but they offered a compromise which the employees rejected. All of the latter struck. The State Board of Arbitration was called upon, and through its officers a compromise was arranged, the men agreeing to work 57 hours per week for 60 hours' pay. The strike lasted just one week.

The New England Structural Iron Company have the contract for furnishing a steel bridge over which Winthrop avenue, Revere, Mass., will cross the tracks of the Boston & Maine Railroad Company when the grade crossing is abolished. The contract amounts to $20,000. The company will also furnish the bridge for a similar purpose at the junction of Broadway and Main street in Everett, Mass., the price being the same. The company wish to build a spur track from the Grand Junction Railroad to a portion of their plant in East Everett, Mass., but a distillery company own intervening land and refused a right of way, so the Structural Company have applied to the Massachusetts Railroad Commissioners for permission to lay tracks along about 30 feet of a street in order to clear the apex of the distillery company's triangular plot of ground. The Commissioners gave a hearing on the matter on the 10th inst., at which several property owners objected to the placing of the tracks in the street. The Commissioners wished to view the location, so they postponed the hearing one week.

The full bench of the Massachusetts Supreme Court has handed down a decision which is of interest to all users of machinery. It upheld three lower court verdicts against a fire proofing company that was sued on account of the death of employees who were killed by an elevator accident. The company had placed "Danger" and "Keep out" signs on the elevator, but had put no ladders in the building, although there were two there which the company's superintendent expected that the employees would use. The superintendent and his assistant were in the habit of using the elevator, and the latter was on it at the time of the accident. The judge of the lower court left it to the jury to decide whether the notices had been so openly disrgarded by the superintendent and others as to become a dead letter, the judge ruling that if the jury found that the defendant or their officers knew that the employees commonly disregarded the notice and openly rode upon the hoist with the sanction of the defendant's representatives this would justify the jury in finding that it was done by invitation. The full Supreme Court says: "We are of the opinion that the instruction was right. The notice in question, if it was addressed to the employees at all, was one forbidding employees to use the hoist and not a notice stating the terms on which they could ride. In case of such a notice the continual and open violation of it is evidence from which the jury may find that it is no longer in force and that it has been abandoned."

The United States Government has called for bids for the building of a blacksmith shop for the Department of Construction and Repair at the Charleston Navy Yard. The building is to be 120 x 350 feet, and 40 feet high, to be constructed of steel and brick, and to cost between $130,000 and $140,000. Coleman Brothers, of this city, have obtained the contract for building the first section of the power transmission subway at the navy yard. The contract price is $34,500. This section will be 1500 feet long and will measure 6 x 6 feet on the inside.

The Boston Board of Fire Underwriters has adopted a rule that builders of machinery may be written under a floating policy at a rate of 75 cents.

Superintendent of Streets Donovan, of this city, has awarded the contract for six boilers for the Calf Pasture Sewer Station, to the I. P. Morris Company of Philadelphia, Pa. The boilers are to be of 186 pounds working pressure, and are to be used for the new pumping engine which has a capacity of 72,000,000 gallons. The company's price was $24,960, and their only competitor was the Atlantic Works of East Boston, whose price was $33,000. The company will furnish and install the boilers.

Aluminum Alloys.

BY K. PIETRUSKY, CHICAGO.

Mechanical Mixtures Not Satisfactory.

Up to the present time the great hopes which were at first entertained in regard to the use of aluminum, "the metal of the future" as it was called, for industrial and technical purposes, have been fulfilled in a very small degree only. The main reason for this is the fact that this metal, on account of its low degree of solidity, cannot be used for technical purposes without the addition of other substances. As our readers well know, the most important purpose for which aluminum is now employed is as an addition in the manufacture of iron and steel, an art of which our metallurgists only a few years ago hardly ever thought.

However, the characteristic properties of aluminum which give this metal its great value—*i. e.*, the low specific weight and the silver glossy color—could not fail to lead to many experiments by the addition of other substances, in order to overcome the defect mentioned above. Thus, during the last year a large number of aluminum alloys have been placed on the market, the greater part of which, however, have disappeared again within a rather short time, as they did not prove to work satisfactorily when given a practical test. The reason for this is said to be found in the fact that, while manufacturing the aluminum alloys, practically only a mechanical mixing takes place between the aluminum and the metal added, always showing, in a more or less marked degree, the defects of such a mechanical mixture. Besides, there is a rather great difference between the melting points of most of the metals employed for such compounds and aluminum. An exception is to be made in regard to the so-called aluminum bronze, but this alloy can hardly be considered an aluminum alloy, as it is practically a copper alloy, judging from the small amount of aluminum it contains—viz., about 10 per cent—and its color and the specific weight.

Two New German Alloys.

Among the aluminum alloys recently placed on the market two have especially occupied the attention of metallurgists in a prominent way—namely, "magnalium" and "meteorit"—two German inventions. A report on the properties of these alloys has recently been published by a German contemporary,* from which we take the liberty to quote the following description:

About ten years ago Dr. Ludwig Mach experimented with alloys for the production of metal mirrors. It was considered indispensable that the composition aimed at should be light, hard, tough and susceptible of polish, and that its gloss should not be easily affected by the air. An equal mixture of magnesium and aluminum proved a very suitable alloy. Following up this discovery Dr. Mach systematically tried all possible proportions of magnesium and aluminum according to their properties and tehnical adaptability, giving the most approved one the name of magnalium, on the production of which he has obtained patent rights from the

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Imperial Patent Office at Berlin. Before this various experiments had been made, with a view to the discovery of suitable alloys, but as at that time neither of the two metals could be obtained technically pure, the alloys did not possess the valuable properties which distinguish the new magnalium.

Aluminum, as well as magnesium, is most difficult to work, inasmuch as the former chokes up the file and is liable to break, while the latter is so tough that neither a file nor the turner's chisel can make any impression. Magnalium, on the other hand, is more suitable than either of its component parts. Alloys containing up to 30 per cent. of magnesium furnish a metal the hardness of which lies about half way between yellow and red brass, and which may easily be worked with any tool; even the weakest screw threads can be cut with proper keenness. The chips are like those of yellow brass, the faces of the pieces are smooth and bright, and choking never takes place even with the finest files. Magnalium, moreover, is chemically less assailable than either of its components. Aluminum by itself has a very indifferent exterior, while magnesium by itself is greatly affected by the air, and oxidation will gradually extend far into the interior. Magnalium is silvery white, remains unaffected by exposure to the air, nor can ammonia or acetic or sulphuric acid harm it in any way. It surpasses aluminum in gloss, tractability, firmness and lightness.

The combinations of aluminum with copper or with zinc can easily be made, but as these two metals are a great deal heavier than aluminum all the advantages due to the light weight of the latter are lost. While aluminum has a specific weight of 2.7, the alloys referred to range between 3 and 3.5. A notable contrast to this is presented by the specific weight of magnalium, which is less than that of pure aluminum—namely, 2 to 2.5—according to composition. Magnalium produced in Sweden shows a specific gravity of only 2.4 to 2.7.

Special Qualities of Magnalium.

Magnalium is sold in the form of bars, tubes, sheets and wire. For melting purposes crucibles of graphite or of iron are used, the inside of the latter having been lined with clay and magnesia. Molten magnalium can be poured into the thinnest vessels of a diameter of down to 2 mm. and of the most intricate forms, and will fill them up thoroughly and faultlessly. It becomes soft at 570 degrees, melts at 600 degrees and becomes fluid at 630 degrees C. On account of its lightness and its silvery white color it is in a high degree suitable for metallic mountings on photographic apparatus, optical instruments and similar articles.

Unfortunately sea water is inimical to magnalium, especially when the latter comes in contact with other metals. This defect renders it, of course, impossible to use the new alloy for ships, as desirable as this might be on account of its lightness and eminent solidity, especially for men-of-war.

In cases in which, for technical purposes, great solidity is of paramount importance, as, for instance, in regard to large castings, an alloy of from 3 to 5 per cent. of magnesium is most suitable. An addition of 10 per cent. of magnesium would render magnalium brittle, while 30 per cent. of magnesium would reduce the solidity of the alloy still more. With only 2.4 per cent. of magnesium added, magnalium can be forged at a temperature of 400 degrees C., and will then act in a similar way to copper at red heat. If containing less than 5 per cent. of magnesium it may be forged in the cold state, and if perchance the hammering has rendered it too hard it can be made malleable again by heating it to a temperature of 500 degrees C. and chilling it thereupon in cold water.

The price of magnalium is about the same as that of copper, and depends mainly upon the price of magnesium. Whereas aluminum may be had (in Germany) for 2 marks (48 cents) a kilogram, the price of magnesium is kept up steadily at 20 marks a kilogram. Were it not for the high value of the latter metal the price of magnalium would be considerably lower than that of copper. It is, however, to be expected that the growing demand will lead to an increased production of magnesium, with the result that also this metal will come down much like aluminum, which, as is well known, has experienced an extraordinary reduction within the last few years. The cheapening of magnesium, however, will be the forerunner of more moderate prices for magnalium.

It remains to be seen whether magnalium will fulfill all the promises given above. Our report states in a general way that aluminum-magnesia alloys also show when worked the great defects of mechanical mixture, as hard places frequently occur in the work. If the tool comes in contact with such hard places it frequently breaks, or the material breaks away, whereby the work done may be considered as practically lost.

The Alloy Meteorit.

The Meteorit-Gesellschaft of Berlin claims to have recently succeeded in producing a metal with pure aluminum as the basis which appears to constitute a very noteworthy solution of the problem. This result has been obtained by the company with the metal they produce, and which is now placed on the market under the name meteorit, by the use of elements, especially phosphates, which are chemically combined with aluminum, so that the dissociation which is apt to take place in aluminum alloys on account of the difference in specific weight and melting point is obviated.

The new light metal meteorit may be made in different degrees of hardness, either soft enough for rolling purposes or of a degree of hardness recommending it for delicate mechanical work and for machine construction. A very important feature is that the technological properties of meteorit also meet all requirements of the trade. It may very readily be turned, drilled, cut, &c., without the use of oil or soapy water. If it is ground a splendid polish of silver white color can be attained without difficulty, which is not affected by moisture or any atmospheric influences. Neither is it affected by the organic acids (acetic acid, nitric acid, &c.), nor by the action of neutral salt solutions. Its specific weight is 2.7. It is, therefore, adapted to replace brass, red brass and many iron parts in vehicles of all kinds. For this reason it is claimed that meteorit is now being used for automobiles to a large extent.

One of the drawbacks to the utility of aluminum has been the defective soldering, whereas meteorit can be soldered by a special solder just as easily as copper and brass. The solder adheres immediately without any previous rubbing being necessary.

As rolling material, meteorit has a tensile strength of about 23 kg. per square millimeter, equal to 14½ tons per square inch, and as casting material nearly 17 kg. per square millimeter, equal to 10½ tons per square inch, with 5.5 to 9.5 per cent elongation. The bending strength is 27.3 kg., or 17½ tons, the compressive strength 60.3 kg., or 38½ tons, and the resistance to ordinary strain 35 kg. per square millimeter, or 22 tons per square inch. With the same volume the weight of meteorit is about one-third that of brass, so that the price is not higher than of brass.

It is claimed by the manufacturers of this new metal that as experiments have shown it is well adapted to replace red brass, brass, German silver and argentan in many branches of industry, because it can be produced in the respective degrees of hardness without any difficulty. It can be used for punching and pressing purposes. It is a suitable material for horseshoes. Drawn meteorit tubes, meteorit wire and bars of various shapes have stood their test well for manifold purposes.

In the interest of technical development let us hope that the near future will prove by practical tests the correctness of this statement in all its details.

Samuel A. Howland, formerly a well-known New England iron founder, died at Hanson, Mass., on September 8, aged 74 years. During the Civil War Mr. Howland was engaged in casting heavy guns for the Government. Later he was connected with the Rhode Island Locomotive Works at Providence as superintendent of the foundries. In 1881 he became superintendent of the New Bedford Iron Foundry, remaining there 10 years.

HARDWARE.

MANUFACTURERS who recognize the value of export trade as an outlet for surplus products, particularly when competition is especially severe in the home market or in periods of unusual depression, are sometimes perplexed as to the best methods of obtaining a foothold abroad. For those who are not familiar with the best practice and to enable them to avoid unnecessary duplication of expensive and unprofitable export experiences reliable information is necessary in regard to methods and conditions which must be comprehended and considered if satisfactory results are to be obtained. Sometimes the market for their products is unsettled by their recklessness in making quotations and in various ways ignoring the interests and rights of their customers, whether commission houses or foreign firms, who are endeavoring to introduce their goods. Manufacturers may thus unwittingly seriously injure the prospect for the early and successful extension of their business in the markets in question by a course of procedure which considered in itself may not be reprehensible, but under the circumstances is both unwise and mischievous.

Our attention has been called to a recent transactiou in which a New York commission house, very unreasonably it would seem, object to the invasion of what they regard as their European territory by the representatives of manufacturers who had arranged to sell some of their product in the European market. The export house were given the prices on a familiar household commodity, with promises of an extra discount if a certain moderate quantity were sold within a specified number of months. The time having expired and only a ridiculously small quantity having been taken, the extra discount not having been earned was not granted. Furthermore, realizing that to make headway other and more energetic methods must be used, the enterprising manufacturers determined to put on one of their own expert salesmen to push the goods in Europe, as only specialists can who are thoroughly familiar with the line. This seemed the only course open to them, as the commission house were selling practically none of their goods. In this way a trade was started, and although not large was much in excess of the previous transactions, and the goods were being scattered and being introduced at the same price as was quoted the commission house. The manufacturers, indeed, avoided the mistake sometimes made of quoting by mail the good, bad and indifferent indiscriminately, as their own representative called upon and established relations with representative houses of approved credit. Under these circumstances it would seem that the complaint of the commission house was entirely without justification. They did not succeed in finding a market for the goods in question, and the manufacturer was constrained either to abandon the foreign field or go direct to the trade and thus lay the foundation at least of a profitable business.

This incident emphasizes the fact that not one method of securing export trade must be relied upon, but cognizance must be taken of the conditions in each case. The manufacturers can sometimes profitably use the connections and the highly organized and strong financial resources of a good commission house. There are cases also in which much has been done by circulars and correspondence and samples. Where the expense does not interpose a serious obstacle the policy of sending a direct representative is often the wisest and most successful. Several of these as well as other methods may frequently be united. Each manufacturer must regard carefully and intelligently the special problem which his own line presents and decide for himself on the best method to secure a foreign market. Before setting out on this quest, however, he must remember that it is not to be easily accomplished, but that, on the other hand, a product which is suited to the needs of the trade abroad will, in the success ultimately obtained, give an ample recompense for the labor and expense entailed in achieving it.

There is a perceptible tendency on the part of houses, both wholesale and retail, to put into operation systems for determining the profit realized through the instrumentality of their different salesmen and to increase or diminish their remuneration accordingly. It is not often feasible to do this by general observation simply of their work or from a general impression as to the profit resulting from the business which passes through their hands, but some system of keeping track of their sales is necessary. The object of whatever system is employed is to discover the employees who are most successful, with a view to getting rid of those whose work is unremunerative or of placing them in another department, and of giving appropriate recognition to salesmen of promise. It may be possible for trade unions to insist on the same wages being paid to inferior and superior workmen alike, but in the commercial field there is no room for the application of such principle.

Condition of Trade.

WITH the advance of the season and touches of cold weather, giving intimations of the coming winter, there is a decided quickening in the demand for fall and winter goods, and this carries with it a general increase in the volume of business. Orders from the jobbing trade are reported by manufacturers as coming in more freely, but many of them are awaiting receipt of goods purchased some time ago, while there is a good deal of correspondence in regard to delayed shipments, as jobbers are urging the execution of their orders. Stocks in their hands seem in most cases to be sufficient to meet present requirements, but as a result of the steady drain made upon them are likely to be exhausted in some lines before the season is over. Holiday and fancy goods are moving in more than the usual quantities, reflecting the tendency on the part of the trade to broaden out on many lines as well as the general prosperity of the people, which makes a good demand for this class of articles. The difficulty of obtaining raw material still embarrasses manufacturers in many branches. With the full employment of skilled labor, and in many sections a scarcity, manufacturers are not in a position to dispute any reasonable demands for increased wages. The production of the country is keeping up its tremendous pace and the spirit of enterprise which dominates is adding constantly to manufacturing facilities in practically all departments. Competition in lines which have been in large measure controlled by combinations or consolidations is on the whole evidently growing, and the outside manufacturers in an enlarging number of fields have to be reckoned with. Negotiations, with a view to effecting further consolidations in several lines are in progress, and it is evident that the tendency in this direction has not yet exhausted itself. The trade recognize that time alone can answer the questions concerning the principles and influences that will determine

tue future course of the market, but while they feel that a great change has to come in the situation sooner or later they are not disturbing themselves greatly about it, and are content to make the most of present opportunities.

Chicago.

(By Telegraph.)

More encouraging reports are being received from manufacturers' agents, jobbers and retailers. The jobbing trade is especially active with orders received faster than it is possible to execute them promptly, some jobbers reporting carrying over of orders from day to day to a greater extent than has existed for many years. The volume of business, compared with that of a year ago, is very satisfactory and the tendency of prices generally considered is upward. If it were possible to pick out one department as being more active than another the advantage might be given to Heavy Hardware. Jobbers in this line report a more urgent demand than ever for large sized Flat and Round Bars, Channels, Beams and Angles, indicating that supplies ordered from the mills some time since are not coming forward as rapidly as needed by manufacturers and contractors. There is an especially active demand for Carriage Bolts, which are very scarce, and Lag Screws are wanted in excess of the supply. One order of 50,000 Coach Screws was placed during the week for mill shipment, but this order will probably not be filled for four months. Orders for Anvils, Bellows and other Blacksmiths' Supplies are increasing rapidly, and the volume of business in Hubs, Rims, Spokes and Wagon Material is large and increasing. One of the features of the week has been the active demand and light supply of Planished Iron and Rolled Steel. Only a few bundles of the former have been obtained in this market, where carloads are needed, and even this small quantity is being shipped to Pittsburgh to be manufactured into goods which will be again reshipped into this market. Another interesting feature of the week has been the sale of Wood Stoves, following the cancellation of orders for coal burning Stoves, from sections where wood is available for fuel. This in its turn has resulted in an increased demand for Axes. An interesting phase, too, has been reached in the competition between the association and the independent manufacturers of Shovels, lower prices resulting. This condition of affairs, however, applies only to the lower quality of Shovels made by the various producers. A unique feature has been the placing on the market of Bull and other brands, to be sold in competition with the Bear. There has been a more active distribution of Laundry Goods and Kitchen Utensils and the movement is increasing rather than otherwise. Manufacturers of Refrigerators have held several meetings recently which have resulted in an advance of 5 per cent. on prices of Refrigerators for next year's delivery. Manufacturers of Lawn Mowers have met with unusual success, some agents reporting goods already sold up to capacity for next year's delivery. In Builders' Hardware there is quite an active demand, including Locks, Latches, Butts, Strap Hinges and various trimmings. On the 24th inst. the contract for supplying Hardware for the Government building in this city will be awarded; at least that is the last day when bids will be received for the entire supply needed. The movement in specialties and Shelf Hardware continues very active.

St. Louis.

(By Telegraph.)

Nothing has come about to interrupt the progress in the Hardware market. All the jobbing interests give a like report and emphasize the fact that conditions in the buying movement show improvement from day to day. Fall and winter supplies constitute largely this heavy volume of demand, and among the items which are recognized on the jobbers' list are holiday goods, which are receiving much attention. Shelf and Builders' Hardware, Carpenters' Tools, Enameled Goods, Cutlery and other items are active sellers at this time. We mentioned in previous reports the rather unusual call for articles in the Stove line, and this condition still rules in volume heavier than heretofore. Advancement in the conditions governing the heavy department of the market continue, and, taken all in all, the report from all jobbers is satisfactory.

Louisville.

W. B. Belknap & Co.—The market for all kinds of material is very active. The effect of importation, which has been undoubtedly felt at Eastern ports, has not been manifested here.

The rolling mills are extremely busy. The difficulty is to get prompt delivery of material contracted for. There are no complaints anywhere of dull business. As to the results, the larger fortunes, however, have not been made in merchandising of late years, but in financing combinations, and such are still going forward all the time, even in our essentially agricultural State of Kentucky.

Coal mines, oil wells, suburban trolley lines—there is no end to the temptations which are laid before the capitalist to invest his fortune. Just now almost anything can be floated as easily as—Ivory soap. Some day the true specific gravity of the securities will have to be found, and then will be the day of reckoning. Meanwhile, *dum vivimus, vivamus*, and let others live, too.

We in this part of the country look with amazement on the continuance of the coal strike in the Eastern fields, and believe that we do things better out West, where we get closer man to man. Possibly, it is that we are further away from the sources of immigration and our workmen and miners are somewhat better assimilated into American citizenship and understand general conditions better. Possibly, it is that there is not so much extreme wealth concentrated in the hands of presidents and managers. Anyhow, we believe it would have been brought to some sort of conclusion before this if Western or Southern men had been charged with the responsibility.

Nashville.

Gray & Dudley Hardware Company.—The wintry weather of the past week has had a most stimulating effect upon trade generally. Orders are getting more numerous each day, and are also larger in size and cover quite an extended variety of goods. The demand for seasonable merchandise is especially heavy. Such goods as Coal Hods, Wood and Coal Heating Stoves, Elbows, Stove Pipe, Fire Shovels, Andirons and Stove Boards are being shipped out in large quantities, and if the volume of business keeps up on these goods it will only be a short time before there will be quite a scarcity of them.

The contractors and builders have had more than they could do for some time, and are now rushed to death with work. More than $2,000,000 worth of building is being done in this city at present, and a large amount of additional construction work is being planned for the near future.

The new Tennessee Central Railroad, which has recently been built into this city, has given a great impetus to trade in general, and when this road is extended through the western part of this State to the Illinois Central and Mississippi River, which will be accomplished within eight months, it will give Nashville a new and independent railroad system of about 300 miles in length extending entirely through the State East and West and opening up a large and new undeveloped country. This country is rich in coal and iron mines, a number of other minerals and timber lands; also a large part of it is a very rich and fertile agricultural district. Although the new railroad has only been in operation about 90 days, it has had a great deal more business than it could handle, and it is now rapidly increasing its equipment, so that it can take care of the trade that is coming to it.

September is the month that country merchants usually go to market, and Nashville seems to be favored this year with an unusually large number of retail dealers from all over the South. They are buying liberally and of the best class of merchandise, and many of them

are paying cash for their goods, which is an indication that the condition of trade is most satisfactory in the South.

Omaha.

LEE-GLASS-ANDREESEN HARDWARE COMPANY.—There is very little change to report in trade conditions of this section. Business in practically all lines is moving along at a satisfactory rate. An active demand exists for all kinds of Hardware and kindred goods. The outlook for future business was never better at this time of the year. Every line of business appears to be in a flourishing condition, with the demand from the country of such liberal proportions as to keep every one fully occupied.

Copious showers of rain have been general throughout the corn belt, and reports received from all sections are of a very encouraging character, so that the prospects for a very heavy yield of corn were never more favorable. With these conditions prevailing, together with remunerative values for all kinds of agricultural products, the present activity in the business world is more than likely to continue for the remainder of the year.

Baltimore.

CARLIN & FULTON.—Trade is quite active and compares favorably with conditions a year ago. The demand for goods is entirely devoid of speculation and represents the actual necessities of the country.

The control of the market by the great consolidations or trusts have undoubtedly caused a feeling of confidence generally as to the stability of prices and there is less hesitation on the part of the average buyer in placing his contracts than when the purchases of one day could be generally discounted the next.

The cool weather of the last few days, resulting in frost in our suburbs, brings the coal question most forcibly to the attention of every one and it is the one dark spot on the business horizon. Every one, whether the consumer of bituminous or of anthracite, hopes for a speedy settlement in some way. We remember an old adage that a ton of coal should equal in value a barrel of flour, but we would hate to see the latter commodity level up now.

All indications point to continued good trade for the balance of the year.

Philadelphia.

SUPPLEE HARDWARE COMPANY.—Trade during September has been very satisfactory in the aggregate in the general line of Hardware. During the summer months jobbers have been able to successfully replenish their stock of such goods as manufacturers have been short on during the past six months, thus enabling them to start on the fall campaign with their stocks generally in good and satisfactory condition. Quite a good many of the retail trade are seeing their way clear to order season goods a little in advance of their wants, owing to their experience during the past six months, there having been a scarcity of many of these goods when the time for selling them had arrived.

Locally, as all readers of *The Iron Age* are aware, we are still suffering from the coal strike, which makes trade in that location very depressing indeed, and very hard on the retailers who are in the striking district. It really is disheartening to those dealers who have been starving their stocks. The outlook for them is not encouraging for the early fall months. Notwithstanding this, trade in many locations is exceedingly good and the railroads are all expecting a very largely increased trade.

It is reported on good authority that the Pennsylvania Railroad Company have ordered made, outside of their own works, 350 new and powerful engines and a number of additional cars, although the cars they added during the last six months have been almost equal to the freight cars they had on hand previous to that date. The shortage in freight cars has been a serious handicap, not only to other trade, but to the average merchant.

Prospects in the agricultural regions are satisfactory to the average farmer as well as to the merchants in those locations. Collections during the past two months have not been up to the average.

San Francisco.

PACIFIC HARDWARE & STEEL COMPANY.—Trade on the coast is in good condition, harvest is about over and the product has been of sufficient magnitude to please most every one. Prices also are good, except prices for fruit, which are not as high as they were last year. Demand for all kinds of products on the Pacific Coast is good, and after the crops for this year have been harvested the net result will be a good showing for the coast.

The activity in building still continues, large buildings, however, still being handicapped by the non-arrival of structural steel, which interferes very largely with the completion of the work.

Export trade is still increasing. San Francisco, as a basis of supplies, is being brought more prominently before the Oriental trade.

The development of oil in California has reached such an extent that the quantity of oil to be produced is guaranteed for some time to come and has induced a great many of the steamship companies to transform their steamers into oil burners instead of burning coal, the oil giving better results and being far cheaper than coal.

Collections are good this time of the year, as the returns of the harvest are now coming in.

NOTES ON PRICES.

Wire Nails.—The movement of Wire Nails from mill continues in about the same volume as for the past week or two. Some jobbers are shading regular quotations slightly. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

To jobbers in carload lots	$2.05
To jobbers in less than carload lots	2.10
To retailers in carload lots	2.10
To retailers in less than carload lots	2.20

New York.—Small lots from store are moving in fair quantities. There is an increase in inquiries and orders for carloads of Wire Nails. Quotations are as follows: Single carloads, $2.20; small lots from store, $2.25 to $2.30.

Chicago, by Telegraph.—There has continued to be quite an active demand, and the market is developing a little firmer feeling; at least there is an undercurrent which seems to favor higher prices. It may be that the wish is father to the thought, as the mills have taken no concerted action. However, it seems not improbable that higher prices may result. Sales continue at $2.15 to $2.20 in car lots, and $2.25 to $2.30 in small lots from store.

St. Louis, by Telegraph.—Wire Nails are moving in very good volume, and carload lots are quoted at $2.25 and small lots from store at $2.30.

Pittsburgh.—Slight improvement in demand this month is reported by some of the mills, but new business being entered for Wire Nails is still very unsatisfactory. There is still more or less uneveness in prices, particularly to some extreme Western points of delivery, to which points some material concessions in delivered prices are being made. The rebate of 5 cents a keg to jobbers in carloads and larger is now very generally allowed. There is no change in quotations, however, which remain at $2.05, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days.

Cut Nails.—There continues to be a scarcity in Cut Nails, particularly in those made from iron, as larger profits can be made by selling the puddled iron than for Nails made from it. The demand for Steel Nails keeps up fairly with the production. Quotations are as follows: $2.05, base, in carloads, and $2.10 in less than carloads, f.o.b. Pittsburgh, plus freight in Tube Rate Book to point of destination; terms 60 days, less 2 per cent. off in 10 days.

New York.—There is no change in the condition of the local market. Demand continues moderate and prices firm. Quotations for carloads and less than carloads are as follows:

Carloads on dock	$2.18
Less than carloads on dock	2.23
Small lots from store	2.30

Chicago, by Telegraph.—The demand for both Iron and Steel Cut Nails continues fair, with supplies not always adequate to supply orders promptly. Carload lots are quotable at $2.20, base, and in jobbing lots at $2.30, base, from store.

St. Louis, by Telegraph.—Light demand rules in the market for Cut Nails and $2.40 is the price for small lots from jobbers' stock.

Pittsburgh.—There is a fairly good demand, but owing to the scarcity of Steel and inferior shipping facilities of the railroads some delay in getting prompt deliveries of Cut Nails is sometimes experienced. Iron Cut Nails continue scarce and bring higher prices than Steel. We quote Steel Cut Nails at $2.05, base, in carloads and $2.10 in less than carloads, plus freight in Tube Rate Book to point of destination, terms 60 days, less 2 per cent. off in 10 days.

Barb Wire.—The market is not active owing to the limited demand. Some jobbers are making slight concessions in carload lots. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. off for cash in 10 days:

	Painted.	Galv.
To jobbers in carload lots	$2.60	$2.90
To jobbers in less than carload lots	2.65	2.95
To retailers in carload lots	2.70	3.00
To retailers in less than carload lots	2.80	3.10

Chicago, by Telegraph.—No special feature is noted, but there has continued to be a good demand throughout the week. Galvanized is sold at $3 to $3.05, and Painted at $2.70 to $2.75 in carload lots, with 5 cents extra for small quantities from store.

St. Louis, by Telegraph.—Improvement continues in the demand for Barb Wire and prices show firmness. Painted at $2.90 and Galvanized at $3.20 is the quotation in small lots from jobbers' stocks.

Pittsburgh.—As yet there are no signs of a marked increase in demand for Barb Wire. The tone of the market is not strong by any means and the mills continue to allow a rebate of 5 cents per 100 pounds to jobbers in carloads and larger lots. We quote as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days: Painted, $2.60; Galvanized, $2.90; less than carload lots, Painted, $2.65; Galvanized, $2.95.

Plain Wire.—The demand is confined, to a considerable extent, to small lots. Quotations are as follows, f.o.b. Pittsburgh, terms 60 days, or 2 per cent. for cash in 10 days:

Base sizes.	Plain.	Galv.
To jobbers in carload lots	$2.00	$2.40
To jobbers in less than carload lots	2.05	2.45
To retailers in carload lots	2.05	2.45
To retailers in less than carload lots	2.15	2.60

The above prices are for base numbers, 6 to 9. The other numbers of Plain and Galvanized Wire take the usual advances, as follows:

6 to 9	Base				$0.40	extra.
10	$0.05	advance	over	base	.40	"
11	.10	"	"	"	.40	"
12 and 12½	.15	"	"	"	.40	"
13	.25	"	"	"	.40	"
14	.35	"	"	"	.40	"
15	.45	"	"	"	.75	"
16	.55	"	"	"	.75	"
17	.70	"	"	"	1.00	"
18	.85	"	"	"	1.00	"

For even weight bundles, 50 pounds and over, 5 cents per bundle advance on above.

Chicago, by Telegraph.—There has been a moderate volume of business, but the tendency is toward more satisfactory orders and the market has remained steady. Carload lots are selling at $2.10 to $2.15 on track, and jobbing lots at $2.20 from store.

St. Louis, by Telegraph.—The demand and inquiry for Plain Wire continues in very fair volume and the quotation in small lots continues at $2.25 for No. 9, and Galvanized at $2.65.

Pittsburgh.—We note a fair demand, but which is not large enough by any means to take the full output of the mills. A rebate of 5 cents per 100 pounds is now generally allowed on carload lots. We quote Plain Wire at $2, base and Galvanized at $2.40 in carloads, f.o.b. at mill, subject to above rebate.

Shovels and Spades.—At a meeting last week the representatives of the associated manufacturers of Shovels and Spades decided that there should be no change in existing prices, so that those now in force will be continued during the quarter which opens October 1. There is no doubt that the manufacturers are full of business, all the factories being taxed to their utmost, while at the same time difficulty is experienced in getting steel. There is a marked tendency in the trade to substitute the Bear brand for the regular fourth grade goods, as it is said there is often but slight difference in quality or finish, while in many cases the goods are substantially the same as the fourth grade. To meet this condition the outside manufacturers are beginning to put on the market a grade corresponding to the Bear brand, under such brands as Bull, Crow, Mule, or Bat. As the association has discontinued payment of subsidies to parties who would otherwise have entered the market, there are indications that some at least of them will soon be actively engaged in the manufacture of Shovels and Spades.

Sewer Pipe.—Owing to the amount of building and improvements going on throughout the country, the season has been a very satisfactory one to manufacturers of Sewer Pipe. The demand has been so large that grading a portion of their output as second quality Pipe, for which a reduction in the regular price was made, has been discontinued by some of the manufacturers, but some is still found in the market. The following discounts, such as are given to jobbers, apply to the list adopted December 19, 1901, and cover standard Pipe and Fittings, 2 to 24 inches in size. Carload lots are generally delivered:

Sewer Pipe.

	Discount.
New England	70 %
New York and New Jersey	73 %
Maryland, Delaware and East Pennsylvania	75 %
West Pennsylvania and West Virginia	76 %
Virginia	78 %
Ohio, Michigan and Kentucky	78 %

J. C. Paul & Co.—J. C. Paul & Co., 59 Dearborn street, Chicago, make the following quotations to the trade on their line of Polishes:

Burnishine, Liquid.

½ pint, per doz.	$1.25;	per gross, $12.00
1 pint, per doz.	2.00;	per gross, 19.20
1 quart, per doz.	3.50;	per gross, 33.60
1 gallon, per doz.	9.00	

Burnishine in Paste Form.

3-oz. box, per doz.	.50;	per gross, $4.50
½-lb box, per doz.	$1.25	
1-lb. box, per doz.	2.00	

Putz Pomade.

3-oz. box, per doz.	.50;	per gross, $4.50
½-lb. box, per doz.	$1.25	
1-lb. box, per doz.	2.00	

Pride of the Bar Metal Polish.

1-lb. box, per doz.	$1.25;	per gross, $12.00
4-lb. box, per doz.	3.00	
12-lb. box, per doz.	9.00	

Cordage.—The Rope market lacks snap, and orders are generally for comparatively small lots. Quotations range, on the basis of 7-16-inch and larger, from 9½ to 10 cents for Sisal and from 12½ to 13 cents for Manila Rope.

Glass.—The Independent Glass Company failed at their second meeting, held last week, to come to any decision as to their future policy, and adjourned subject to the call of the chairman. The adjourned meeting it is expected will be held some day this week, when the future policy of the company, it is probable, will be de-

cided upon. It is stated that the Federation Window Glass Company have chosen Columbus, Ohio, as the location of their main offices and headquarters, from which point they will handle the entire production of their 39 plants, whose total output per year is calculated to be over 2,000,000 boxes of Glass. A meeting of the National Window Glass Jobbers' Association and of the combined Window Glass manufacturers is scheduled to be held soon after the coming meeting of the Independent Glass Company. The Window Glass situation, it will be seen from the foregoing, is still in a complicated condition. The Jobbers' Association quotations are as follows for single and double strength Glass:

	Discount.
From store	88 and 5 %
F.o.b. factory, carload lots	89 and 5 %

Paints and Colors.—*Leads.*—The market for Lead products is active, and the demand for White Lead in Oil is on the increase. The outlook is for the use of a large quantity during the fall months. Quotations are as follows: In lots of 500 pounds or over, 6 cents per pound; in lots of less than 500 pounds, 6½ cents per pound.

Oils.—*Linseed Oil.*—The market lacks stability, and regular quotations do not represent the prices at which Oil is sold in the local market. The reduction in price on September 8 by manufacturers brought quotations down to 57 cents per gallon for City Raw in lots of five barrels or more. Out of town brands of Raw for similar lots were then quoted at 55 cents. Since the early part of this week out of town Raw has been quoted, in answer to inquiries, from 53 to 50 cents per gallon, and the price of City Raw has also been shaded. These prices apply to five-barrel lots or over for immediate delivery. Large buyers are looking for 40-cent Oil, and are not placing contracts for future delivery at present prices. The receipts of new seed exceed that of the corresponding time last year. The demand for small lots of Oil is of fair volume.

Spirits Turpentine.—The Turpentine market has strengthened during the week at this point, with higher values, as a result of a strong Southern market. A good business is reported at Savannah, with the larger part of Turpentine in the hands of exporters. During the past season production has been somewhat restricted, which is said to have been beneficial to producers. Supplies at this point, it is understood, are largely in the hands of one concern, which strengthens the local market. Quotations, according to quantity, are as follows: Southerns, 48½ to 49 cents; machine made barrels, 49 to 49½ cents per gallon.

NEW ENGLAND IRON AND HARDWARE ASSOCIATION.

THE September meeting of the New England Iron and Hardware Association was held at the Point Shirley Club, Winthrop, on Tuesday, September 16, at 5.30 p.m. Through the courtesy of Charles Clark Adams of Sargent & Co. the privileges of the club were extended to the members and guests accompanying them after 2 o'clock p.m. At 6 o'clock one of the fish dinners for which this club is justly celebrated was served. There was music by the band, beginning at 5 o'clock and at intervals during the dinner, as well as vocal music of a popular character afterward. John T. Boyd, chairman of arrangements, in his announcement stated that the meeting was intended to be more of an outing than the members of the association had had for some time, and suggested that all who possibly could do so should go to the club on early trains in the afternoon for the purpose of renewing their acquaintance. This injunction was observed, and the whole affair was of a very jolly character and was apparently much enjoyed by all those in attendance. The situation of the club house directly on the seashore and the brilliant moonlight combined to make the evening and the trip home particularly pleasant. President Oscar A. Shepard welcomed everybody and conducted the brief business session and the informal post prandial exercises which followed the dinner.

SPORTING GOODS AS HARDWARE.

A Merchant's Argument for Their Sale in the Hardware Store.

DURING the past ten years the interest in all outdoor sports has increased and is growing greater each year. All classes are sportsmen to-day, and the open fishing streams, protected and stocked by State governments, give all sportsmen an opportunity to fish. Shorter work days and the Saturday half holidays are giving the time needed for outdoor sports. This tendency of our time to recreation out of doors is making a large demand for all implements that are used in these sports.

It is through the channel of the Hardware trade that Sporting Goods can be most economically handled.

Guns, Ammunition, Etc.

It is generally admitted that Sporting Goods, and especially Guns, Ammunition and Fishing Tackle, are kindred lines to Hardware. Most Hardware dealers to-day handle some sporting goods—generally Loaded Shells and Guns, which are sold on a small margin; but the great majority of the trade do not carry a complete stock, or they sell the lines of Sportsmen's Supplies in which there is the best profit. When Muzzle Loaded Guns were used the sportsman found his wants supplied in the Hardware store, where he was able to procure Powder and Shot. Then when Loaded Shells and Metallic Ammunition came more into use many Hardwaremen continued in the Ammunition trade, but because Loaded Shells are easily sold the margin is small. The profit on Ammunition is about 25 per cent., but some of the high priced Guns are sold on even a less margin. However, the retailer will find these profitable lines to handle.

During the past few years there has been growing up a large demand for Single Shotguns, and on these Single Guns the profit is larger. The sale of these medium priced Guns is constantly increasing, and the American Single Guns give very good satisfaction and often create demand for higher priced goods.

On Loading Tools and Hunting Sundries, such as Gun Cases and Shooting Coats, a profit of from 50 to 75 per cent. can be made. The demand for these goods is constantly increasing, and it would be impossible, of course, to sell this latter line unless Guns and Ammunition were carried.

Men are the principal customers of the Hardware store, and as a general thing Sporting Goods are bought by men.

Fishing Tackle.

There is very little additional expense in handling Sporting Goods, as if a general line is carried the sale continues pretty well throughout the entire year. Fishing Tackle is a more difficult line to learn and to successfully sell than Guns and Ammunition, and, simply because it has greater detail, will show a larger margin of profit.

Styles and kinds of Fishing Tackle manufactured are all out of proportion to the quantity that is sold. The dealer putting in a stock of Tackle should be careful to purchase such goods as are adapted to the local fishing.

Of course, in Fishing Tackle the volume is not large, but as has been said the profit is good. Rods and Reels pay from 60 to 75 per cent. profit, while on Lines and small Tackle a margin of from 75 to 200 per cent. can be made. In the North and in the West the Fishing Tackle trade begins generally in April or May, and continues through the summer and up to about the Gun season.

Baseball, Tennis, Golf, Etc.

To make the line of Sporting Goods complete Baseball and all goods for outdoor sports should be added. If golf is played in the vicinity put in Golf Goods and let people know that they are sold. On Baseball Goods the profit is from 25 to 50 per cent.; dead stock would not accumulate, as there is but slight change in styles and prices are about the same from year to year.

Hammocks.

Hammocks are now handled by many Hardwaremen. They have become generally connected with the Hardware line by a process of gradual association. Hard-

ware dealers have handled Twine in connection with Hardware. The first Hammocks which were made were made of Twine and by Twine mills, and Twine Hammocks and Twine being akin naturally took the same outlet to the consumer, and continued through this channel throughout the present growth of the cotton Hammock, until at present there is hardly any jobbing Hardware house but handles some line of Hammocks.

Photography.

Of all Sporting Goods Photo Supplies are perhaps the most difficult to add without some risk. Until the trade is well established there is apt to be some loss incurred, as films and most photo papers spoil rapidly. This is a line that can be added after the trade has come to know the Hardware store as a Sporting Goods store.

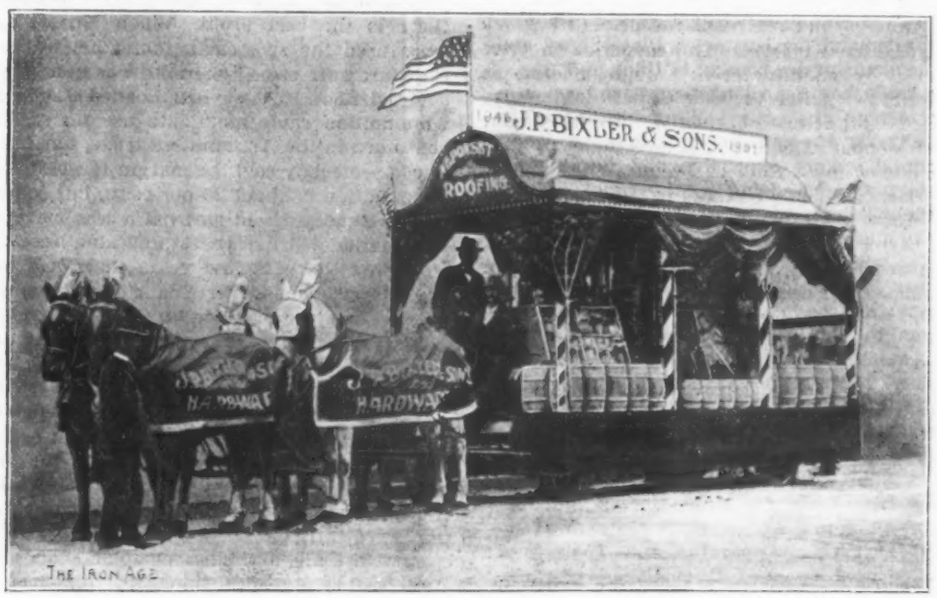
Sporting Goods Profitable.

A successful Hardware retailer in one of our smaller manufacturing cities, speaking on this subject of Sporting Goods in the Hardware store, said: "For nine years we have handled Sporting Goods. We have never regretted putting in the line. We have found when there has been a large strike on in our city, when the mills have been closed and business generally is quiet, we are very apt to do a larger trade in Sporting Goods."

Occasionally a Hardwareman will refuse to consider Sporting Goods because he feels that he has not time to investigate and learn the business, but generally such a merchant is one who is not particularly anxious to see his business grow. The enterprising Hardwareman is one who is adding these new lines, and is generally willing to intrust some of the responsibility of the business to others. Sporting Goods business to be handled most successfully should be made into a separate department, and it is a good idea to take one of the younger ambitious clerks, one who is interested in sports, and put him in charge of the department. I.

A TRADES DISPLAY FLOAT.

The accompanying illustration shows a float used by J. P. Bixler & Sons upon the occasion of the Sesquicentennial held at Carlisle, Pa. The float was 8 feet wide and 16 feet long. On it were two pyramids, upon the sides, ends and top of which goods were displayed. The sides of the front pyramid were occupied by Lock Sets. On the end of the front pyramid and on the sides and end of the back pyramid were Carpenters' Tools, Circular Saws, Paint Brushes, &c. On the top of the front pyramid were placed Meat Grinders and Sausage Stuffers, and on the top of the back pyramid a Plow was secured. In the center of the float, between the two pyramids, was an arch 7 feet high, made of Paint Cans, and under the arch was a stand of Kegs, advertising the Ready Mixed Paints for which the firm have the agency. On the rear part of the float, behind the pyramid, was a 300-pound Bronze Bell, which was rung during the parade. The border around the edge of the float consisted of Nail and White Lead Kegs. The roof was covered with the brand of Building Paper for which the firm have the agency. Shovels, Rakes, Forks, &c., were attached to the upright posts. On the corners of the float were lap robes and the sides were draped with Horse Blankets. Upon the roof of the float the following was painted: "1846, J. P. Bixler & Sons, 1901." The float was drawn by four fine horses, upon which were red covers bearing the firm's name in white. Two of their delivery wagons followed with covers of similar character on the horses.



A Trades Display Float.

AMERICAN FORK & HOE COMPANY.

THE organization of the American Fork & Hoe Company has just been completed. The central office has been established in the American Trust Building, Cleveland, Ohio. The capital is $4,000,000. The directors are William H. Withington, F. S. Kretsinger, Thomas H. Russell, John A. Carter, M. B. Johnson, W. H. Cowdery, F. L. Andrews, E. N. Abbott, H. G. Ely, W. C. Mason, J. W. Klemm, Geo. B. Durell, George S. Russell, J. L. Evans and Cleveland Childs.

The plants merged in the new corporation are as follows: Withington & Cooley Mfg. Company, Jackson, Mich.; Iowa Farming Tool Company, Fort Madison, Iowa; Geneva Tool Company, Geneva, Ohio; Brown, Hinman & Huntington Company, Columbus, Ohio; Batcheller & Sons Company, Wallingford, Vt.; Ely Hoe & Tool Company, St. Johnsbury, Vt.; Utica Tool Company, Utica, N. Y.; L. Bolles Hoe & Tool Company, Binghamton, N. Y.; Sheble & Klemm Company, Smith Harper Company and Myers, Ervien & Co., Philadelphia, Pa.; Otsego Fork Mills Company, Girard. Pa., and Ashtabula Tool Company, Ashtabula, Ohio.

The officers of the new company are: President, Gen. W. H. Withington; first vice-president, W. H. Cowdery; second vice-president, F. L. Andrews; third vice-president, F. S. Kretsinger; treasurer, John L. Evans; secretary, Geo. S. Kelly. Department officers are as follows: Manufactures, F. S. Kretsinger; purchases, Thomas H. Russell; sales, W. H. Cowdery, and auditing, E. D. Lowell.

The prices established by the new company are about ready, though not yet announced. It is, however, understood that they will be of a conservative character.

BRITISH LETTER.

Office of *The Iron Age*, Hastings House, Norfolk St., London, W. C.

The Week's Hardware Trade.

THERE has been but little trade done during the past week—the first week in September—and a review of the month of August indicates a distinct slackening in trade all around. I am bound to confess I am among the pessimists, and I believe that by next November we shall have in this country an unemployed problem not dissimilar from that of 1893 or 1894, and growing more and more acutely for the next 12 months. I, of course, hope I am wrong, but it is useless to deny that all the symptoms point in this direction.

The most active department in the Hardware trade this week has been Gas Brackets and Chandeliers, but the old activity in Lamps, always a feature of this time of the year, is conspicuous by its absence. It seems as if the electric light industry is hitting the Lamp trade very hard. Edged Tool makers are busy, but mainly on export account, and there is a good demand for all kinds of Iron Hurdles, Gates, &c., and the makers of Wrought Iron Tubes are fully employed. I again draw attention to the abnormal demand for Enameled Plate Signs, and orders in this department are coming in thick and fast.

The Scissor trade has for a long time past been in a bad way, but is now distinctly looking brighter. The demand is chiefly for the medium and cheaper goods, rather than for the more expensive and durable articles. There is not much doing in the fancy Scissor trade. A Sheffield Scissor manufacturer has succeeded in putting on the market a new Scissor for clipping ends of cigarettes, for which there has long been a demand. There have been mechanical difficulties in producing this Scissor, but they have now been overcome. The great thing was to obtain perfect uniformity in the blades, but the machinery now in use turns out a steel Scissor, not only better and cheaper than the hand made article, but all exactly alike and interchangeable. They have already been put to practical use in cigarette factories with satisfactory results.

On export account large orders have been received during the week from India for Nails, Chains and Padlocks. Orders from South Africa are mainly for Mining Machinery, Irrigating Apparatus and Tools, and good orders have been received from Canada for Tin Plates. The rest of the export trade this week has been of average character.

A MANUFACTURER'S IMPRESSIONS.

WE are indebted to William H. Pratt, treasurer of the Goodell-Pratt Company, Greenfield, Mass., for the following advices in regard to the features of trade in American Tools as observed by him in his recent trip through England and the Continent:

In the Hardware and small Tool lines I should say that business in England was good, considering the season; in Holland and Belgium fair; in Germany poor; in France small Tools are moving freely, while in other branches of the Hardware trade conditions do not seem to be quite as satisfactory.

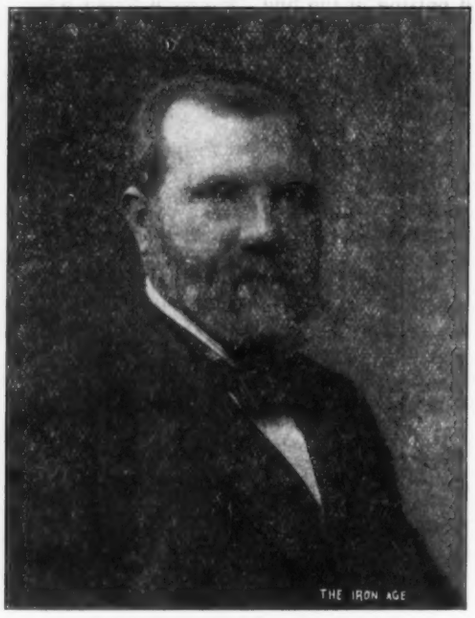
It occurs to the writer that our chief competition lies in Germany. He visited the Düsseldorf Exposition and was very much interested in the progress which the Germans have been making. Certainly it is well to sound a note of warning to American manufacturers that they must not underestimate a competitor. We must not think that the world and all the trade there is in it belongs to us. Undoubtedly in the small Tool line we have never received of the world's export business much more than a pittance, and for this reason we can look for a continued increase, but we must not think for one moment that a nation as progressive as Germany is going to stand aside or sit idly by and see us get very large proportions of the world's business. They are wide awake and pushing, and they will not hesitate to copy our ideas.

There has also been a disposition on the part of some American manufacturers to ignore to quite a considerable degree their export business during the prosperous times which we are now experiencing, and which we have experienced for the past few years. They have seen fit to summarily advance prices beyond what seemed reasonable figures, and in many instances they have sent abroad goods which were not fit to have passed their inspection departments.

American Hardware and Tools, in the writer's opinion, must be sold on their quality, and unless that quality will merit the higher price which we naturally ask for them we cannot expect to continue to hold our prestige.

SAMUEL DISSTON'S BIRTHDAY.

ABOUT 53 years ago Samuel Disston, then a boy of 12 years of age, left his home in Nottingham, England, for the United States. On the 15th day of September, 1850 (which was his birthday), he commenced his business career in the Saw factory of Henry Disston,



SAMUEL DISSTON.

Philadelphia, in which concern he passed through all the departments of manufacture, so that he might become proficient in every detail and practically acquainted with every process through which the Saws pass in the process of manufacture. It is no exaggeration to say that there is not an important feature in the Saw trade in which Mr. Disston is not an expert, and his knowledge, derived from an experience of 50 years in the greatest Saw manufacturing concern in the world, has given him a commanding position among manufacturers the world over. After about 25 years' experience in the various processes of manufacture Mr. Disston, or "Sam," as he is more familiarly known, took up the selling end of the business, and through his energy the Disston Saw has been distributed to practically every country on the face of the earth. The ability and wisdom shown in the general direction of the business as well as in the marketing of the products of the company are universally acknowledged. Not only for his business qualities has the subject of this notice become widely known, but his strong personality has impressed itself not only on the 2500 or more hands in the offices and in the workshops, but on the trade in all parts of the world. The employees appear to recognize that Mr. Disston is not only their employer, but their friend. It is very pleasant to walk through the works and note that he knows every man by name, and that members of any of the families who may be sick or otherwise distressed are subjects of kindly inquiry.

To outsiders Mr. Disston may appear to be somewhat brusque in manner, but those who have been in any way connected with him in the relations of business or as

employees know that he is of the most kindly and sympathetic nature, and always ready to give a helping hand in time of need. When the firm of Henry Disston & Sons was incorporated in 1887 Samuel Disston was elected to the office of secretary and general manager, which position he still retains. On the occasion of his recent birthday he was the recipient of many kindly expressions and congratulations, in which a host of friends throughout the trade will join with sincere wishes for many years of continued activity and usefulness.

PENNSYLVANIA WHOLESALE HARDWARE AND SUPPLY ASSOCIATION.

THE regular semiannual meeting of the Pennsylvania Wholesale Hardware and Supply Association was held in Lancaster, Pa., on September 10, the business meetings being held at Rossmore, one of the lovely suburban places of the city. The meeting was well attended and great interest was manifested in everything brought up for discussion. The meeting was called to order by the first vice-president, George W. Bard, of Bard, Schlott & Co., Reading, Pa., in the absence of President Kemmerer of Bittenbender & Co., Scranton, Pa. The following members were present:

Members Present.

SCRANTON.
Fred'k W. Shear, Foote & Shear.
Ralph E. Weeks, Foote & Shear.
W. E. Bittenbender, Bittenbender & Co.

WILKES-BARRE.
F. G. Phelps, Phelps, Straw & Co.
Geo. W. Lewis, Phelps, Straw & Co.
C. I. Stout, Pennsylvania Supply Company.

READING.
A. B. Stein, Bright & Co.
George W. Bard, Bard, Schlott & Co.
J. H. Obold, J. H. Obold & Co.

LEBANON.
Geo. D. Krause, Geo. Krause & Co.
Frank E. Krause, Geo. Krause & Co.
Chas. L. Henry, Geo. Krause & Co.

LEWISBURG.
H. G. Dreisbach, C. Dreisbach's Sons.

HAZLETON.
F. S. Bleckley, Hazleton Machinery & Supply Company.

LANCASTER.
H. S. Franklin, Steinman Hardware Company.
Geo. S. Franklin, Steinman Hardware Company.
R. M. Reilly, Reilly Bros. & Raub.
H. L. Raub, Reilly Bros. & Raub.

Price Card.

After the reading of the minutes of the previous meeting and the report of the secretary, the report of Geo. W. Lewis, chairman of the Price Committee, was taken up and the matters which were referred to this committee were thoroughly discussed, especially the advisability of having a price card. It was decided after a full discussion that it was not practicable to establish a price card by the general association, but the recommendation was made that it would be advisable to have this matter taken care of by local organizations.

Cost of Doing Business.

The question of the cost of doing business was taken up, and during the discussion it was developed that it would be advisable for this association to ascertain the different costs of selling staples, Shelf Goods, Cutlery and Sporting Goods. The question occupied the association during the morning session and until the adjournment for luncheon.

Cash Discount.

On the reassembling of the association, after routine business, including the election of some new members, the question of cash discounts and the time which should be extended was taken up for discussion. This question occupied most of the time of the afternoon session, every member participating. Some of the members believed it was necessary in many cases to use judgment in the strict application of the rule of cash discount in ten days. In some cases it was regarded as desirable to accept a check a few days after the time limit had expired rather than to lose a customer. The majority of the members, however, were in favor of strictly enforcing the ten-day limit for a cash discount, on the theory that this was not a trade discount but a premium offered for the prompt payment of bills, and it was finally decided that rubber stamps should be used by every member of this association embodying the principle as given above. It was also decided that checks arriving after the time limit had expired with the cash discount deducted should be returned.

Annual Meeting at Scranton.

At this point Frederick W. Shear addressed the association on the manifold advantages of the city of Scranton as a proper place for holding the annual meeting of the association, and it was finally decided to accept the invitation of the Scranton members and to meet the Scranton, Pa., on Wednesday, March 11, 1903.

After some routine business the association adjourned and the members were taken on a tour of the city, visiting "Wheatland," the old residence of President Buchanan, and afterward some of the many factories of the city.

A banquet was tendered the visiting members at 8 o'clock in the evening at the Hamilton Club, R. M. Reilly being toastmaster. Addresses were made by Major B. Frank Breneman, president of the Hamilton Club; T. James Fernley of the National Hardware Association; Chas. A. Fondersmith, president of the Lancaster Board of Trade; E. T. Fraim of the Keystone Lock Works; J. O. Dreisbach of Sidney Shepard & Co., Buffalo, N. Y.; W. S. Wolf of the Reading Hardware Company, Reading, Pa.; H. S. Franklin of the Steinman Hardware Company; Geo. W. Lewis of Phelps, Straw & Co., and H. G. Dreisbach of C. Dreisbach's Sons.

The committee in charge of the arrangements at Lancaster were H. S. Franklin, R. M. Reilly, Geo. S. Franklin, E. T. Fraim and H. L. Raub.

PRICE-LISTS, CIRCULARS, &c.

J. C. PAUL & Co., 91 Randolph street, Chicago, Ill.: Catalogue and price-list of the company's Polishes and Enamels as follows: Burnishine, liquid and paste form; Pride of the Bar, powdered form; German Putz Pomade, in liquid and paste form; XXX Quick Dying Enamel, liquid form; Russet Leather Dressing and Patent Leather Dressing, for shoes; Black Brilliant Stove Polish; Silver Rouge, liquid polish for silver and plated ware, and Water Proof Leather Enamel.

OIL WELL SUPPLY COMPANY, Pittsburgh, Pa.: Price-list, Section A, Oil Well Supplies; everything required to drill, equip and operate gas, oil and water wells, including Derrick Rigs, Boilers, Steam and Gas Engines, Drilling and Fishing Tools, Cables, Drive Pipe, Casing, Tubing, Line and Steam Pipe, Pumps, Sucker Rods, Fittings, &c.

E. P. GLEASON MFG. COMPANY, 181-189 Mercer street, New York: Catalogue S, devoted to Illuminating and Heating Burners, Brackets, Fittings and miscellaneous goods.

J. CURLEY & BROTHER, 6 Warren street, New York: Circulars describing and illustrating the Curley Ideal Safety Razor, Razor Strops, Pocket Cutlery, Scissors, &c.

EDW. K. TRYON, JR., & Co., Philadelphia, Pa.: Fall catalogue, devoted to Table Tennis, Golf, Footballs, Skates and General Sporting Goods.

OTT BROTHERS & Co., Wheeling, W. Va.: An attractively printed fall and winter illustrated catalogue and price-list of 58 pages.

COSMOPOLITAN LIGHT COMPANY, 41-45 State street, Chicago, Ill.: Cosmo Arc Lights for inside and outside lighting, with Mantles for burning gas. Each Light has a number of burners, each of which are supplied with a separate gas cock, by which any burner may be turned off independent of the others. The Light is 600 candle power.

A. LESCHEN & SONS ROPE COMPANY, St. Louis, Mo.: A pamphlet entitled "Song of the Elevator," in which attention is interestingly called to the merits of their patent Flattened Strand Wire Rope, especially for use as elevator cable.

HOLIDAY HINTS.

FOR the holiday season of 1901-1902 the Pease-Humphrey Hardware Company of West Superior, Wis., issued an exceedingly attractive pamphlet of 20 pages, 6 x 7 inches in size, entitled "Holiday Hints," illustrating, with appropriate reading matter, such articles as would appeal to Christmas shoppers. The covers were of egg shell green paper, with the illustration shown in Fig. 1, appearing on the front cover. The pages of the pamphlet were of fine grade white calendered paper printed in red and black. The title page, illustrated in

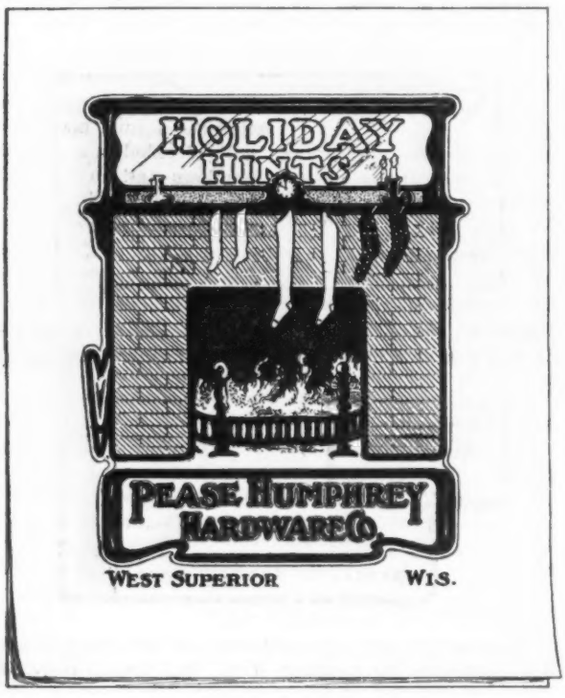


Fig. 1.—Front Cover of Holiday Pamphlet.

Fig. 2.—Title Page of Holiday Pamphlet.

Fig. 2, calls attention to Christmas shopping, and a few pointers that shoppers would find at the company's store. On a subsequent page use was made of one of *The Iron Age* advertising cuts—No. 47—as shown in the upper left hand corner of Fig. 3.

The pamphlets were mailed in white envelopes with the company's card, shown in Fig. 4, in black, red and green, on the upper left hand portion of the envelopes, which were tied with white tape. The books were sent to the best families in the city, being mailed ten days

"If you want to give me something
else too, it might be one of those little Tea Bells; they look just like solid silver, and have the sweetest tone
"Nell was with me this afternoon, and she found such a pretty baking dish which she is going to buy for mother I am almost selfish enough to wish I had thought of it first. It will make such a beautiful gift; and we saw such a fine line of nickle-plated and decorated Tea and Coffee Pots in pretty new shapes They are all made by the celebrated manufacturers, Manning, Bow-
TEA BELLS
BRONZED "QUEEN" HANDLES
TEA POTS

Fig. 3.—Another Page of Holiday Pamphlet.

before Christmas. The effect was immediate and continued until after the holidays. The idea in getting out the book was to make it so attractive that the one received at each house would be examined by all members of the family, and that it would surely suggest a want

Fig. 4.—Illustration on Pamphlet Envelope.

to some one in nearly every home. The company's show windows were made one of the attractive features of the city during the three weeks of the holiday trade, and it was found that they paid big returns for the time and money spent on them.

EXPANSION BOLTS.

STEWARD & ROMAINE MFG. COMPANY, Philadelphia, Pa., have bought out the business of the Philadelphia Expansion Bolt Works, and in future the latter plant will be known as the Philadelphia Expansion Bolt Works, Steward & Romaine, proprietors. This gives the old concern of Steward & Romaine Mfg. Company a much more extended list of expansions and designs in Expansion Bolts, making them exceptionally large producers of these goods. The company advise us that their past year's business has doubled that of any previous year, and that their foreign demand has increased to such an extent that they have two foreign agents to whom they make shipments every month.

CHARLES FACH of St. Louis, the veteran Hardware salesman, is at present visiting New York. Mr. Fach, though he has retired from the Hardware business, takes a special pleasure in keeping in touch with the trade with which he was so actively identified.

MORLEY BROTHERS' FORTIETH ANNIVERSARY.

MORLEY BROTHERS, Saginaw, Mich., manufacturers of Lumbering Tools, Harness, Horse Collars, &c., and wholesalers of almost everything in Hardware and related lines, are arranging for the celebration of the fortieth anniversary of the establishment of their business in 1863, which will occur in about four months. It may be interesting to those who are conversant with the magnitude of the enterprise to-day to know what the pioneer conditions of 40 years ago were, as related by George W. Morley, the president of the concern:

It is 40 years since we first opened up a small establishment in Saginaw, and in those early days the only way by which the river could be crossed was by a rope ferry. We could catch fish on the dock back of our store and shoot wild ducks, and I can even recall the catching of a young bear at the back of our store. Where

the virgin forests stood untouched there are now rows of fine business blocks and asphalted pavements. In those days our freight and passenger transportation business was almost wholly by water, where we now have competing trunk line railway facilities. Our store 40 years ago was a small wooden building; now we have a frontage of 666 feet, covered with buildings, besides two large warehouses and 360 feet front of railroad and dock facilities on the river. One has only to consider the ground and buildings which we now occupy to realize what a large and complete plant we have, representing the growth of 40 years, which we believe has been accomplished by conscientious push and energy.

The other officers of the company are E. W. Morley, vice-president; Ralph C. Morley, treasurer, and Harry C. Barnes, secretary.

In this connection they have prepared a lapel button in five colors for the use of their salesmen, customers and friends, the buttons representing different departments and special goods. They may also be obtained by others by addressing the Sales Department, Morley Brothers, Saginaw, Mich.

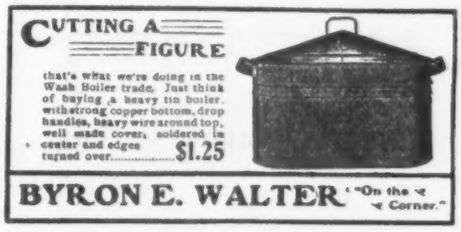
U. M. C. COMPANY'S ADVERTISING DEVICES.

AMONG the latest advertising specialties for gratuitous distribution by the Union Metallic Cartridge Company, Bridgeport, Conn., and 315 Broadway, New York, is a group of felt mats, four varieties, each 13 x 11¾ inches square, of thick wool felt, to lay on the top of a glass showcase to protect the surface from injury when the salesman is showing Revolvers, Cutlery, Ammunition and other Metallic Wares. One mat calls attention to Smokeless Powder, another to Loaded Shells, a third to Cartridges, &c. Another useful device is a heavy cardboard hanger, 13¾ x 9¾ inches, on which is shown actual size in *fac-simile* colors their Shotgun Ammunition. On one side down the board are illustrated the empty Shells—viz.: Union, Challenge, Monarch, Magic, Acme and Expert—while a parallel column on the right of the card shows the corresponding Shells as loaded by them, viz.: New Club, Nitro Club (with bulk smokeless powder), Nitro Club (dense smokeless powder), Arrow (bulk smokeless), Arrow (dense smokeless) and Trap Loaded Shells, the last named group being the exact counterpart of the empty Shells except in name so as to absolutely distinguish Shells loaded at the factory from Shells loaded by private or other individuals. In the center of the card are two columns of Wads, actual size and color. This chart shows at a glance the corresponding Shells of both classes.

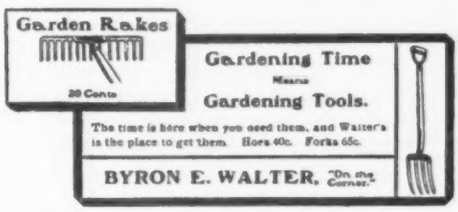
Still another set of literature is a series of illuminated folders, envelope size, describing the different kinds of Loaded Shells, one of which, in card form, is suitable for scoring.

A GROUP OF ADVERTISEMENTS.

The accompanying illustrations of advertisements, reduced in size, indicate the way in which Byron E.


CUTTING A FIGURE
that's what we're doing in the Wash Boiler trade. Just think of buying a heavy tin boiler, with strong copper bottom, drop handles, heavy wire around top, well made cover, soldered in center and edges turned over..... $1.25
BYRON E. WALTER "On the Corner."

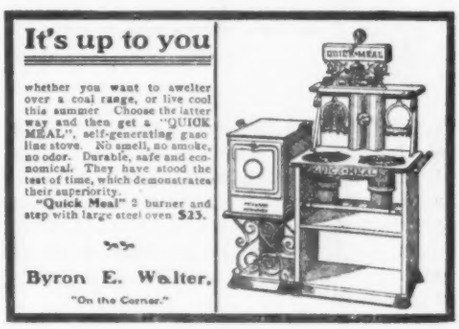
Walter of South Milwaukee, Wis., courts publicity through the newspapers. The advertisements appeared


Garden Rakes
20 Cents
Gardening Time
Means
Gardening Tools.
The time is here when you need them, and Walter's is the place to get them. Hoes 40c. Forks 65c.
BYRON E. WALTER, "On the Corner."

in three issues, and were different in style from other advertisements surrounding them. Another feature of

NICKEL PLATED COPPER WARE
will outlast and outwear any other ware on the market. "Rochester" ware heads the list. Quality has made it so. A hint at prices may start you to thinking.
2 pint Tea or Coffee Pots 45c
Tea Kettles, small 85c
Tea Kettles, 9 size 1.10
Wash Boilers, 8 size, nickled copper 3.00
Byron E. Walter "On the Corner."

the advertisements of the "On the corner" man is that they are always found in the same location, near the


It's up to you
whether you want to swelter over a coal range, or live cool this summer. Choose the latter way and then get a "QUICK MEAL", self-generating gaso line stove. No smell, no smoke, no odor. Durable, safe and economical. They have stood the test of time, which demonstrates their superiority.
"Quick Meal" 2 burner and step with large steel oven $25.
Byron E. Walter,
"On the Corner."
QUICK MEAL

column of local news. They are striking and easily seen; short and quickly read and illustrated with prices.

The MONARCH LAWN MOWER
is built to wear. Walter sells it, so that's sufficient guarantee as to quality. Monarch Mowers $2.50 and $3.00
Byron E. Walter, "On the Corner"

Whether the prices are low or not, they are calculated to impress readers, and purchasers know just what they will have to pay for the goods before they leave home.

THE BOLEY WIRE FENCE COMPANY.

THE BOLEY WIRE FENCE COMPANY, Sandusky, Ohio, increased their capital stock on August 29 from $30,000 to $50,000. The demand for Boley Wire Fence has been such, we are advised, that the concern are far behind their orders, although they have only started to establish agencies, and the increased capitalization is to supply more machinery for the coming spring trade. The Boley Fence is factory woven out of No. 9 Wire, securely fastened at crossings with their patent clamp and shipped in rolls ready to stretch. The company emphasize the fact that only one size of Wire is used in their Fence.

AMONG THE HARDWARE TRADE.

J. G. Campbell, Perth, N. D., has disposed of the Implement part of his business to Currie & Riggs, dealers in Farm Machinery, Vehicles, Wagons, Wind Mills, &c. Mr. Campbell will hereafter devote himself entirely to the sale of Hardware.

G. R. Farnum, Hamilton, Ind., has disposed of his Hardware stock and building to A. H. Greiner, formerly of Chicago, Ill., who will continue at the old stand.

Oren Stratton, Carthage, S. D., has sold his Hardware, Stove, Tinware, Sporting Goods and Harness business to James Shields and Wm. Cowell, who will continue under the style of Shields & Cowell.

Leonard & Blivens, who recently bought out L. A. Cochrane's Hardware business at Gravett, Ark., subsequently disposed of it to C. E. Thomas, formerly proprietor of a general store.

Checotah Hardware Company, Checotah, I. T., have incorporated with a capital stock of $25,000. The company will conduct the wholesale and retail business in Shelf Hardware, Stoves and Tinware, Wagons, Buggies, Agricultural Implements, Queensware, Harness, furniture, &c.

The Coughlin Hardware Company, recently incorporated with a capital of $50,000, are successors to Coughlin-Martin Hardware Company, at Topeka, Kan., wholesale and retail dealers in general Hardware, Tinware, Stoves and Miners' Supplies. T. J. Coughlin, president of the company, will manage the business.

John R. Cox, Hardware, Stove and Agricultural Implement merchant, Plattsmouth, Neb., has been succeeded by John Bauer.

The G. A. Pauly Hardware Company, St. Louis, Mo., have been incorporated with a capital stock of $10,000, and will continue the retail business in Shelf and Builders' Hardware, Paints, Glass, Stoves, &c. The company are proprietors of two stores, one being located in the central part of the city and the other in the extreme west, and report business as very satisfactory during the past four years.

Moscow Hardware Company, wholesale and retail dealers in Hardware, Building Material, Paints and Oils, Lime, Cement, groceries, &c., Moscow, Idaho, have recently invested $12,000 in a three-story building on the corner of Fourth and Main streets, with 45 feet frontage, and a brick warehouse, 40 x 80 feet, in the rear, fronting on Washington street. The company report a large increase in their business and an excellent prospect for the future.

Elmer E. Deal, Parker City, Ind., is erecting a two-story building for his retail Hardware, Stove and Tinware business.

R. B. Quimby has disposed of his Hardware, Stove and Tinware business in Wakefield, Neb., to K. E. Alexander who continues at the old stand.

W. H. Hancy, dealer in Hardware, Stoves, Tinware, Farming Implements, Hay, Feed, Seeds, &c., Claremont, W. Va., has commenced the erection of a new store building, which will be 30 x 80 feet, two stories high, with cellar; also a warehouse, 16 x 24 feet.

The Strack Hardware Company, Mount Vernon, Ind., have been incorporated with a capital of $7000 for the purpose of conducting the Hardware, Stove, Tin, Plumbing and Heating business, the incorporators being Frank Strack, Jacob M. Harlan, Leopold Rosenbaum, Louis H. Keck, Edward E. Highman and Braddock McGregor.

M. Snedeker is successor to Riley & Snedeker in the Hardware, Stove and Farming Implement business in Hatfield, Mo.

E. E. Laudess, of the firm of Laudess & Bradford, dealers in Hardware, furniture, &c., Van Buren, Ind., has purchased the A. D. Davis property, upon which he will erect a two-story brick building, 24 x 112 feet, with wing, 24 x 42 feet, for the business.

The McDowell-Keithley-Graves Hardware Company, Cabool, Mo., have incorporated with a capital stock of $10,000. They will conduct a wholesale and retail business in Shelf and Heavy Hardware, Tinware, Farm Implements, furniture, &c.

The Dilworth Hardware Company, incorporated with a capital of $10,000, have lately commenced business in Shawnee, O. T. Their line embraces both Shelf and Heavy Hardware, Stoves and Tinware, Sporting Goods, &c.

Hopkins & Bro., formerly of Indiana, have purchased the Hardware and Agricultural Implement store of O. F. Neal, Mont Ida, Kan.

The store of the Kimmins Hardware Company, Alvin, Texas, was destroyed by fire a few weeks since.

A. W. Lee has disposed of his Hardware, Tinware, Agricultural Implement and Sporting Goods business in Cairo, Ga., to Sapp Hardware Company.

The store of Fred H. Keuthan, 911 Franklin Avenue, St. Louis, Mo., was recently damaged by fire to the extent of $600.

Havron Bros., dealers in Hardware, Stoves, Tinware, Agricultural Implements, Sporting Goods, &c., Jasper, Tenn., have sold their business to J. C. Kelly.

J. O. Peterson has purchased his partner's interest in the Hardware store of Peterson & Robinson, Gary, S. D., and will continue under his own name.

Geo. Schultz and F. S. Smith have opened a new store at Davis, S. D., under the style of Schultz & Smith. Their line consists of Shelf and Heavy Hardware.

Kershner Hardware Company, Poplar Bluff, Mo., have succeeded Kerschner & Mathews, Mr. Mathews disposing of his interest to his partner.

J. A. Miller has been succeeded in the Hardware business in Adams, Neb., by Miller & Kahm.

The Dawley Hardware & Furniture Company have lately commenced operations at Ordway, Col. The officers of the company are H. A. Dawley, president and H. J. Sprinkler, secretary. Mark J. Baldwin will manage the business.

Foster Hardware Company, Lorimer, Iowa, have changed the style of the concern to Foster Bros.

TRADE ITEMS.

JOHN E. HARBSTER, secretary of the Reading Hardware Company, Reading, Pa., was the guest of Manager W. H. Bennett of the Chicago branch this week.

THE INDIANA SHOVEL COMPANY, New Castle, Ind., has been sold to C. W. Mouch, who had previously been president and general manager of the company. The amount paid for the property was $56,812.50. The capacity of the company is to be enlarged. A rolling mill to furnish sheet steel is being built and additional machinery will be added and the output of the plant increased to 400 dozen per day. A Handle manufacturing plant and natural gas plant are owned by the same interest. With these additional facilities and the employment of experienced mechanics the business of the enterprise will be pushed to the utmost.

A CONSOLIDATION of the interests of a number of Sewing Machine plants is under way, and it is understood that negotiations have reached a point where it seems likely that the project will be successfully consummated. The capital of the proposed consolidation will be about $30,000,000, and in the neighborhood of a dozen plants will be comprised in it. Barnabas Eldridge, president of the National Sewing Machine Company, whose extensive plant is at Belvidere, Ill., is regarded as likely to be the head of the new corporation. Foley & Williams Mfg. Company of Chicago, who are mentioned as one of the parties to the consolidation, advise us, however, that nothing definite has been accomplished so far as their company are concerned. They state that the promotion of such an enterprise has been in progress for over a year, but that no money has been paid and that the contemplated consolidation will make no changes in their policy. They will continue the construction of their new factory, which has been under way for some time.

REQUEST FOR CATALOGUES, &c.

Lake's C. O. D. Store, Greenville, Miss., have bought the business of the Mississippi Hardware Company of that city. The stock thus acquired has been added to their own, making an aggregate of $40,000 to $50,000 worth of goods. The Lake concern do both a wholesale and retail business, handling Shelf and Heavy Hardware, Stoves and Tinware, Agricultural Implements, &c. They request information in regard to discounts from any manufacturers in the above lines.

MISCELLANEOUS NOTE.

Glasbrite.

The Glasbrite Company, 1327 Williamson Building, Cleveland, Ohio, are offering a paste in tin cans for cleaning windows, enameled ware, glass, china, crockery, solid silver, nickel and plated surfaces, cut glass, jewelry, marble, &c. Cleaning does not depend upon friction, it is explained, because there is no grit in Glasbrite; also there is no soap in the composition and it does not leave streaks. It is not a scouring substance, it is remarked, and is applied with a damp cloth and then rubbed off, leaving the article with its original brilliancy.

The Wright Fly Escape.

In Fig. 1 of the accompanying cuts is represented a fly escape put on the market by Frank Wright, Cave Springs, Ga. The escape consists of a metal strip to be attached to the under side of the top bar of window screens, as shown in Fig. 2. The escapes may also be applied to screen doors. The strip has on one side, at intervals of every inch, projecting arms that pass through the meshes of the wire cloth along its folded top edge, giving it support and at the same time leaving narrow spaces between each arm for the escape of the insects. It is remarked that the fact has been taken advantage of that flies searching for means of escape will readily walk up through a hole while they will not walk down through an opening. The manufacturer

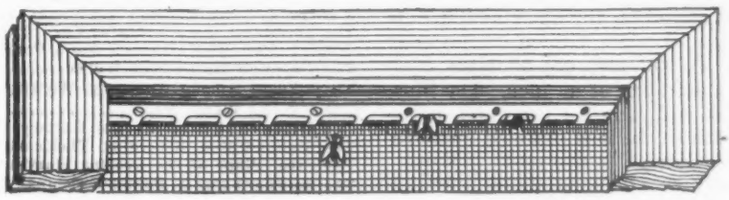


Fig. 2.—Fly Escape Window Screen.

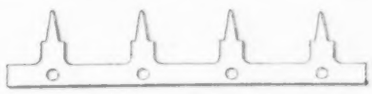


Fig. 1.—The Wright Fly Escape.

is prepared to furnish the escapes in nickeled tin and galvanized sheet metal or window screens with the escapes attached.

Linindoll's Patent Hasp Latch.

The Acme Mfg. Company, Fort Edward, N. Y., for whom Allerton-Clarke Company, 97 Chambers street, New York, are general selling agents, have just brought out Linindoll's patent hasp latch for roll and swing doors, gates, &c., as shown in Figs. 1 and 2 respectively. Fig. 1 illustrates a hasp latch that works automatically, there being a stout vertical spiral steel spring which is let into a space mortised out of the door and protected by the narow metallic plate just back of the center of the latch so that when the open door is rolled to close it the staple causes the notched hasp to rise until it passes a given point, when the spring forces the hasp downward and secures the door. Fig. 2 is similarly constructed, the main difference being in the form of staple, which is modified to suit the necessities of a swing door. In closing either door the latch is lifted 7-16 inch. It is made of malleable iron and japanned. The manufacturers refer to it as economical, adjustable, serviceable and moderate in cost.

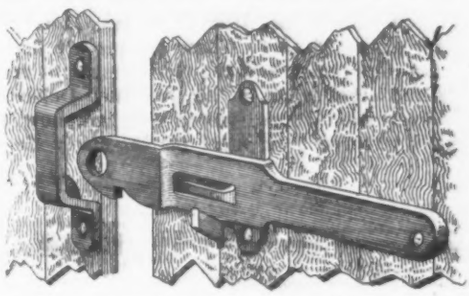


Fig. 1.—Linindoll's Hasp Latch for Roll Door.

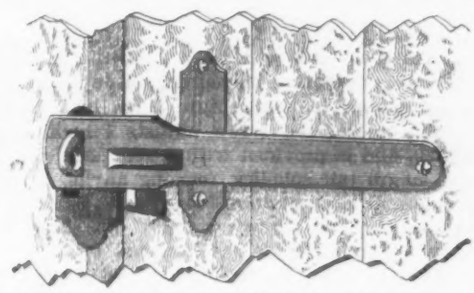


Fig. 2.—Similar Latch Suitable for Swing Door.

Micrometer Gauges.

The L. S. Starrett Company, Athol, Mass., and 123 Liberty street, New York, have recently put on the market some improved forms of gauges, of which the two here illustrated are examples. Fig. 1 represents paper gauge micrometer No. 223, with ring, which is used for measuring the thickness of paper, cardboard, sheet rubber, &c. The disks are placed on the anvil and spindle so that measurements can be taken without compressing the articles measured. It will measure all sizes from zero to 11-32 inch by thousandths of an inch. The illustration shows the gauge with knurled end ratchet, the purpose of which is to enable the user to know instantly

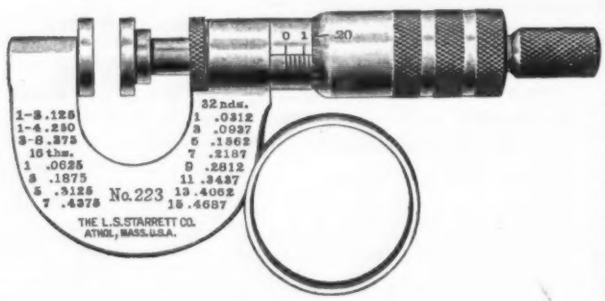


Fig. 1.—Paper Gauge Micrometer.

when the disks meet the article to be measured and gives the operator the advantage of a more delicate touch, as when the disk meets with resistance the ratchet turns without forcing the disks further along. The same gauge is made without the ring attachment at a less price and is known as No. 225. Another of the same series is the No. 223M, graduated to read in hundredths of a millimeter, while still another is the same as the No. 225, only graduated to read to hundredths of a millimeter. All of the above styles are made with or without ratchet, those without ratchet costing 50 cents each less on the list. Fig. 2 illustrates United States Government micrometer gauge No. 127. These gauges are designed to meet the requirements of the Government in making big guns and other work in the Ordnance Department of the Government shops, where they are now used. The frames are cut from steel plates, nicely finished.

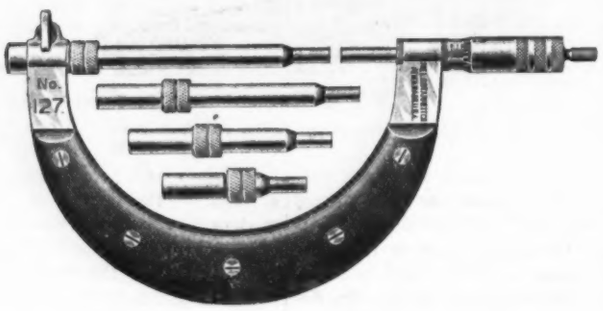


Fig. 2.—United States Government Micrometer Gauge.

The sides are covered with hard rubber, put on with brass screws, preventing inaccuracy through expansion caused by change in temperature when held in warm hands. The micrometer screw adjusts 1 inch, reading 1-1000 inch, and is provided with patent lock nut. The different length tail spindles, forming anvils, are interchangeable and have positive stops to set against their socketed seats. The adjusting collars on these anvils have notches to facilitate the removal of dirt which would prevent them from setting accurately against the seat. The contact ends of the spindles are slightly convex, to prevent catching on cylindrical work. The gauges can be furnished with ratchet stop or speeded screw thumb piece, as desired. A similar gauge is made, No. 127M, only graduated in metric measurement for recording by hundredths of a millimeter.

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